No. 13 1959

THE CANADIAN ASSOCIATION OF GEOGRAPHERS

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LE GÉOGRAPHE CANADIEN

L'ASSOCIATION CANADIENNE DES GÉOGRAPHES

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The objectives of the Association are to promote the study of, and research in, geography. Full Membership, for which the annual dues are $10, is open to any professional geographer. Full-time university undergraduate students may become Student Members for $3 per annum. The annual dues for Associate Membership, which is open to any other person interested in the objectives of the Association, is $7. Organisations desiring to support the Association may also apply for a sustaining membreship at $25.

Le but de l'Association est de promouvoir l'étude et la recherche en géographie. Tout géographe professionnel, moyennant une contribution annuelle de $10, peut devenir membre actif de l'Association. Pour la somme de $3 par année tout étudiant inscrit comme sous-gradué en géographie dans une université, peut devenir membre-étudiant. Enfin peut devenir membre-associé de l'Association pour la somme de $7 par année, toute persone qui s'intéresse aux objectifs de l'Association. Organisations désirant venir en aide à l'Association peuvent devenir Membres de Soutien à $25.

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Published by

THE CANADIAN ASSOCIATION OF GEOGRAPHERS

Publié par

L'ASSOCIATION CANADIENNE DES GÉOGRAPHES

Price — $2.00 — Prix

THE GEOGRAPHER AS CITIZEN*

TREVOR LLOYD, Ph.D., D.Sc.
President of the Association, 1957-58

RÉSUMÉ. *L'enseignement de la géographie au Canada en tant que sujet académique est relativement récent. Le titre de "géographe", déjà très ancien, honora les noms d'explorateurs bien connus, dont David Thompson qui il y a un siècle et demi, cartographiait la majeure partie de l'Ouest canadien.*

La présente génération de géographe professionnels, composée surtout d'éléments très jeunes, a contribué largement aux recherches sur le Nord canadien. Dû surtout à l'amélioration des méthodes photogrammétriques et cartographiques, la génération actuelle pourrait bien être l'une des dernières à faire oeuvre de pionnière dans ces régions septentrionales. Dès lors, les jeunes géographes se doivent d'acquérir une plus vaste expérience en travaillant davantage dans ces régions retirées.

Depuis quelques décades, l'enseignement de la géographie a été mal orienté et presque totalement négligé dans bon nombre d'institutions. Une des raisons pour cet état de choses a été l'introduction à l'échelon élémentaire des soi-disant "études sociales". Ainsi donc, une génération a grandi, avec une ignorance déplorable des conditions géographiqnes de leur pays et de ceux d'outre-mer. La réforme de l'enseignement de la géographie élémentaire devrait être le premier but de cette Association.

Un appel est lancé aux géographes de faire oeuvre communautaire, par l'étude d'un plan à grande échelle pour nos régions sous-développées, surtout celles situées plus au nord. La vallée du fleuve Mackenzie est une de ces régions ou un tel apport comblerait un grand besoin. Qu'il soit permis de suggérer l'étude attentive de ces régions dans l'espoir qu'elles deviennent les noyaux des centres futurs et non seulement sources de matière première pour les régions du sud.

Les géographes sont donc dans l'obligation de se servir du monde comme d'un laboratoire et d'accentuer davantage l'interdépendance de ses diverses parties.

Presidents of this Association have in past years chosen varied topics as farewell messages before turning the responsibilities of office over to a successor. Some have used the occasion to report on a branch of our discipline of which they possessed special knowledge, others have chosen to review some aspect of geographical education or methodology, with particular reference to Canada. All have shown an awareness that they were addressing not only the immediate group before them, but also, through the press and the pages of our journal, a wider audience within this country and abroad.

This evening I ask you to consider with me some of the responsibilities of the geographer to society at large. All disciplines have well-recognized obligations to add to the sum of knowledge and improve its organization, to train their successors and also to pass the essence of their discoveries on to the comunity. It seems to me that geographers have a still broader obligation because of the special content and method of their science, and the world-wide panorama it keeps constantly before them.

In 1942, our Honorary President, Professor Griffith Taylor, then President of the Association of American Geographers, used these words:

> "Cannot we geographers study the world to such purpose that we shall in time be accepted as a body well suited to guide the nation along the paths of material and cultural progress?

and he continued —

> May the day come when the public will say of every careful student of our discipline 'He has studied material progress all over the world... He is a competent geographer. We must listen to him'."[1]

I interpret this as requiring us to take a more than ordinary part in the formulation of public policies in spheres where our specialized knowledge and broad experience of the world entitles us to be heard. This evening I shall try to examine a few topics from the viewpoint of the geographer who as a citizen is concerned with Canadian policies at the local, national and world level.

GEOGRAPHY IN CANADA

The two hundred or so members of this Association reflect, by their comparative youth, the fact that academic geography is relatively new in Canada. This organization of ours is not yet ten years old, and the senior university department of geography in Canada less than twenty-

* Presidential address delivered at the Eighth Annual Meeting of the Canadian Association of Geographers, Edmonton, Alberta, 1958.

five. In the autumn of 1930 when on a transcontinental journey from Newfoundland to Vancouver Island, stopping at many universities on the way, my claim to being a geographer was quite generally met with polite mystification. At one prairie city meeting, the chairman frankly doubted the possibility of anyone having studied geography during five university years, if only because, as he put it "In this province we complete it by grade 7".

Yet despite its seeming newness geography has a long and honorable tradition in this country. It has always seemed remarkable that Canada with so short a record of human history should devote such a disproportionately large part of its school programme to the subject, while all too little effort seems to have been made to interest children in the country's geography, which all must agree is extensive, varied and challenging.

Nevertheless, be it said to the credit of Canada's history teachers that they have paid greater tribute to one of the country's outstanding geographers than has our own profession. I refer of course to David Thompson whose blazing of many a western trail may some day be commemorated by giving his name to a highway running from near this city of Edmonton toward the Rockies, which he did so much to delineate. We should remind our students more often of the monumental map of western Canada he worked on a century and a half ago, and of his meticulous labours in determining the location of the international boundary to the west of the Great Lakes. Thompson is often referred to as a "surveyor", and though this is by Canadian tradition an honourable calling, he was far more than that, and a geographer in the truest sense. Our profession can fairly claim him as one of its founders in this country. Those of our members who may find themselves confronted with the problems of transferring to the map for the first time, details of the landscape in some remote spot, might well hope to achieve the accuracy in mapping and the thoroughness in recording that were his outstanding characteristics.[2]

Among the many dividends that have accrued during the past decade from establishment of the government Geographical Branch in Ottawa is the fact that the profession of geography has once again achieved a publicly recognized status comparable with that of the years when the pioneer *Atlas of Canada*, published in 1906, stated boldly on the title page that it was edited by 'James White, Geographer'" May I expres the hope that Dr. Norman L. Nicholson's labours to produce a worthy modern successor to it may be similarly recognized.[3]

THE NORTHLAND AS A SCHOOL FOR GEOGRAPHERS

In a recent issue[4] of the journal *ARCTIC* published by the Arctic Institute of North America, is a survey of geographical field studies carried on during the past ten years in northern Canada by the staff of the Geographical Branch in Ottawa. It makes extraordinarily impressive reading and deserves to be widely known. As recently as 1947 when the Branch was founded, the view was held in some quarters that geographers should be content to confine their efforts to the classroom, the drawing office and the library, there to assemble the basic data garnered by more specialized and enterprizing scientists from other disciplines. Since those days the Geographical Branch, and university geographers associated with it from time to time, have carried on field work not only *a mari usque ad mare* but almost literally "From Pole to Borderland", and one hears little now about condemning geographers to be mere office compilers of other men's facts. A large body of well-trained, alert and active geographers, many of them still quite young, have been at work recording on maps, in notebooks or on photographs, the basic data they know will be needed; interpreting them as an aid to resource development, urban and rural planning, the location of new settlements or the transfer of old ones (whether to avoid the rising tide of the St. Lawrence Seaway or the sinking mud of the melting permafrost at Aklavik). They have sought a better understanding of land surfaces and their origins, the distribution of natural vegeta-

tion and its relationships to past or present climates, the origin and movements of land and sea ice, and countless other diverse but inter-related aspects of nature and the works of man. They have also played an important part in the plotting of the new maps showing such elementary but fundamental matters as the whereabouts of coasts, islands, lakes and rivers.

Our's may well be the last generation of Canadian geographers able to share in this topographic pioneering. The approaching completion of the basic aerial photography of Canada will deprive us of the old god-like pose of sitting high in the heavens in an aeroplane, map and pencil in hand meting out the waters from the land and reshaping coastlines as the earth turns beneath us. No aerial pioneer myself, I have yet felt a modest sense of creation as, seated in a navigator's blister in a high-flying Lancaster ten years ago, I gently shifted the edge of the Precambrian Shield a trifle of fifty miles at the southern end of Admiralty Inlet. Never again, I suppose, will a geographer do in Canada as Dr. Laurence M. Gould once did, when he moved that famous landmark, Cape Dorchester, at the southwestern corner of Baffin Island, about a hundred miles farther southward, and had the rare experience for an explorer of *removing* 5000 square miles from the map.[5]

If only because this may be the last generation of Canadian geographers able to experience such pioneer field work, we should I believe do everything we can as teachers and administrators to enable younger members of the profession to gain at least some field experience in the remoter parts of the country. It might even become a tradition that spurs are to be won, not in studies of the Central Business District of some gigantic Megopolis, or in careful enquiries into the shuttling of freight cars between cities, but out where the north begins. One of the lessons we may usefully learn from the educational methods of our Soviet colleagues is the value of giving all serious students of geography personal experience at first hand of a wide variety of landscapes, considering the cost a normal part of the expense of a good professional education. In doing this some way might be found of stimulating young Canadians to explore the remoter reaches of their native land, instead of leaving so much of the task to newcomers.

GEOGRAPHY IN THE SCHOOL

I have already mentioned the teaching of elementary school geography, or rather the unfortunate absence of it in many of our schools. This is a favorite target for criticism, not only from geographers, but from those of our fellow citizens who decry the inability of modern youth to pin-point on the map this place or that with the supposed speed and accuracy of their elders. As one who over the years has often ranged himself with the critics, may I suggest that the time has now arrived for us to study the situation in our schools anew and to concentrate effort on possible ways of improving it.

Elementary geography teaching has suffered in the past thirty years in North America, but not apparently elsewhere, from neglect leading almost to stagnation. Many children are, at least in factual geographical knowledge, literally less well informed than were their grandparents. If geography has suffered from neglect it has also, paradoxically suffered from over-attention on the part of the pedagogues"[6] who have too often mastered the skills of "teaching" without bothering to learn how to teach anything in particular. This unkindly cut of mine comes, not as from some remote occupant of a university chair, but from one who was trained as an elementary school teacher and served a long apprnticeship in that honourable and strenuous profession. The basic reason for the low repute of geography in our schools is simply that most of those who have for the past three decades taught the subject, and those who have taught the teachers, have known too little about what modern geography *is*. The neglect in the classroom that is now generally acknowledged, has been due to an almost total lack of qualified geography teachers. To make matters worse there were for many years, no modern textbooks prepared specially for use in Cana-

dian schools by authors who were themselves geography teachers.[7]

Added to the obvious handicaps caused by lack of teachers and inadequate textbooks was something that geographers have done their best to correct for many years. Largely as a result of the work of curriculum planners intent, perhaps, on tidying up the timetable, such a clearly-defined and recognized subject as elementary geography became lost in a newly created subject usually referred to as "Social Studies". With more sorrow than indignation I have to report that Alberta, and perhaps even Edmonton, became one of the main temples of this heresy[8]. There may be something to be said for the unity of knowledge, and it is even possible to argue that history and geography have much in common. But it never seemed to me that sound educational theory required one to spray young minds with a random sample of history (especially constitutional history), placename geography, primitive economics, sociology and current events (made up largely of newspaper chit-chat), the whole spiced with a warm glow of civic virtue. The passage of time has now revealed what might earlier have been discovered from study of first principles, that the treatment does not work, and has never worked since it was first essayed more than thirty years ago. Truth to tell, it has scarcely been applied, for as prescribed it could not be carried out by any elementary teacher I have ever met. What has in fact happened is that history of a sort has been taught, interrupted by occasional dabs of the kind of geography that is a mixture of place names, intimate tales of how Bongo Bongo ekes out a living in the Congo, and the techniques for achieving the impossible culinary feat of making a convincing relief map of Africa out of flour, salt and water.

It is now almost universally agreed that the children have in fact learned little good history and less geography. Added to this, a generation that should surely have been blessed with all the civic virtues seem to have turned out to be at least as delinquent as their forebears and possibly more so. One axiom for teachers of Freshman geography in American universities, doubtless true also in many parts of Canada, is that none of the students know any geography whatsoever. It must have been extraordinary difficult to bring up a generation quite so devoid of elementary knowledge of the "earth and those that dwell therein", but the pedagogues seem to have achieved it.

May I suggest in all seriousness that the time has now come to reduce Canada's importation of pedagogical notions, by shall we say at least 15%[9] and that the Social Studies curriculum be the first item to be repatriated.

There is now no longer any good reason why elementary geography should not be taught properly in our schools. There are in Canada several satisfactory modern textbooks and others appear from time to time. While there is at present a lamentable shortage of trained geography teachers, in fact they are almost totally lacking outside the high schools, this can be remedied. In some provinces the universities are producing excellent high school geography teachers, and it might now prove helpful if our profession paid particular attention to the training of elementary teachers, since few if any of the Normal Schools and corresponding institutions include qualified geographers on their staffs.

The time surely cannot be distant when every province will offer some form of geographical instruction at each level of the school system. Only then will the students entering the universities, and the adult population as a whole, be reasonably well informed not only about their own land but also about the rest of the world on which they all depend for their livelihood, for their wellbeing and even, possibly, for their continued existence.

GEOGRAPHERS IN THE SERVICE OF THE COMMUNITY

With so much basic geographical research immediately at hand awaiting attention, it is natural that Canadian geographers have concentrated their efforts on the study of comparatively small areas. This has been particularly so in the case of economic geography. Nevertheless

there is urgent need for studies on a much larger scale, and this should not be delayed until all the fragments of the mosaic that is Canada, are ready to hand. It has seemed to some that Canadian geographers have been too hesitant in offering their services for preparation of studies needed by national and provincial Royal Commissions, with the result that studies which might well have been prepared by geographers have been turned over to others. Two recent Royal Commissions — those dealing with the future of the Canadian economy, and with a national fuel policy would seem to be of this type.

In the halcyon days of the T.V.A. when our southern neighbour was still in a mood to experiment in discovering the form of social organization best suited to a rich and expanding society, geographers were very active both in assessing the resources of the Tennessee region and in developing plans for their best use. It appears that Canada is now in just such a mood, and that there is a national urge to develop the natural and human resources now available or likely to be so in the not distant future, by broad planning, involving direct government assistance at various levels of the economy, with ample latitude left for individual or corporate initiative. This provides geographers with an almost ideal climate in which to work, whether in government agencies, in private industry, or in the universities. In many parts of Europe, and most notably in the Soviet Union it is now unthinkable that a large-scale project of the magnitude of the St. Lawrence Seaway, expansion of irrigation on the prairies, development of the interior of British Columbia, the laying out of a new transportation network in the Mackenzie Basin, the harnessing of the Passamaquoddy tides, or the opening-up of a completely new mining region in northern Manitoba would be thought possible without the active participation of geographers at all levels. The newness and youth of the geographical profession here is of course one reason for the modest contribution made so far, but it is not a good reason for future inactivity. May I urge professional colleagues not to be hesitant in offering their services on even the largest schemes. There is no inherent opposition to the employment of geographers in such work, but there is widespread unawareness of what they are capable of doing. For the past few years some thought has been given to plans for exploiting an iron ore deposit in northern Quebec. It so happened that the nature of the area — north of the treeline on Ungava Bay where the sea ice conditions are severe, the shipping season is short, there are exceptionally high tides, and in general physical circumstances are possibly a little more severe than those encountered in mining and shipping iron ore elsewhere, called for new ideas to complement the experience gained farther south. Add to this the fact that much of the product must be sold in Europe, it is obvious that some ingenuity is called for in devising a transportation system that is both dependable and economical. In such a case the geographer is able to assemble a wide variety of known facts — and in some cases to search them out if they are not yet available — and to bring to bear on them a judgment trained to consider simultaneously a wide range of circumstances, within this country and elsewhere. In such a case the lack of narrow specialization which is sometimes deplored as a handicap of the geographer is turned into an asset.

With the under-developed Canadian northland in mind I would like to consider with you how geographers may proceed from fact-gathering and classifying to the riskier realm of forecasting.

For the past two decades I have been interested in development of the Mackenzie Valley, as an extension of the western prairies. The time would now seem to be at hand when reasonably dependable conclusions can be reached as to its future. There has been a notable upsurge of interest in the area in the past decade but there have been no major developments since the opening of gold mining at Yellowknife twenty years ago, and that itself was an isolated event. It is extraordinary that such a large region, united by rivers and large lakes, endowed with a climate

little more severe than that in the settled prairie — and less severe than well populated parts of the U.S.S.R.—should almost have stood still for more than fifty years, and have developed so little since the first fur traders pioneered it over a century and a half ago. It consists of uniform lowland for much of its area, where transportation routes could be constructed with little difficulty; it includes mineral resources that are known, and agricultural possibilities that, though limited have been demonstrated by the missionaries and traders and casual immigrants for about a century. In other words it has no insurmountable problems to Canadians who have settled an enormous and diverse land from Newfoundland to the Pacific.

While much remains to be learned, there is now sufficient basic information to suggest the lines along which the region should be developed. As in all pioneer areas transportation is the first essential. The main arteries need to be provided there, as they have in other parts of the country, at public cost. This is a task which cannot justify the expenditure of private capital needing a fair return in a reasonable time. The "return" will as always come to the community as a whole — and the community may be expected to provide the outlay. The first essential remains, as it was in the middle of the 19th century, to link the Mackenzie River itself with the prairies. The Northern Alberta Railway extending due north from Edmonton was a helf-hearted stride in the right direction. It should now be extended to Great Slave Lake. This will give access to the potentially rich area around Great Slake Lake where minerals may be expected to prove worth developing. An all-weather highway should then be extended down the Mackenzie Valley — either between Great Slave Lake and Great Bear Lake or nearer to the river itself, but provided with offshooth to tap the Canadian Shield. The route should pass through the Norman Wells oilfield down the river to within reach of the new Aklavik, and should also run westward to link up with the Yukon transportation system. Along this highway and railway system a series of modern all weather airports is needed. Government policy, already announced, follows part of the scheme outlined above, It is in fact the bare minimum of transportation needed to open up a most promising region, for Canadians are no longer prepared to "disappear into the bush" without regular contact with their fellows to the south. Mines in this region cannot be developed when the only link with a market and the source of supplies, is by airplane and a primitive system of river boats.

The question of contact with the "outside" is vital because large scale development of the region will demand it. Nevertheless it is important to raise one caution. We are inclined by tradition to think of pioneer areas as being tributary to older, more developed regions. Winnipeg was at one time a convenient point at which to gather profits from the western prairies before posting them on to Montreal or Toronto. The frontier moved west so that today Edmonton may be thought of as a similar gathering point for the surplus to be skimmed from areas still farther north. Should we not rather be thinking in terms of developing a region such as the Mackenzie Valley, as a unit in itself, though not of course entirely self-contained. Should not its natural resources be utilized as fas as possible on the spot, so that people, who are far more readily moved than goods, might form large settlements there ? This has eventually been the outcome elsewhere. Could it not be done rather sooner here ? What is available ? Minerals of sufficient quantity and variety to ensure that mining and processing them can continue for a long time to come. Power — water power — in generous supply. A detailed plan is needed for developing the Slave River rapids between Fitzgerald and Fort Smith, where there is a head of more than a hundred feet and a large natural reservoir upstream. Oil exists at Norman and doubtless elsewhere, there is fish in the lakes, there are forests and no lack of building sites and a good climate. Is the time not overdue for a team of geographers to be put to work to develop a

long-range scheme which may be ready before the roads are completed ? Doubtless the putting into effect of any such plan would follow the traditional happy mean of Canada's economy — government and private resources being pooled for the common good.

Corresponding long-term development schemes are needed for other northern areas — that east of the Mackenzie, along the Arctic coast; for the west side of Hudson Bay, for northernmost Quebec now on the verge of development, and also for the Eastern Arctic. In this latter case it may be necessary to look a little farther than the confines of Canada itself. It is recognised that east coasts in high latitudes are notoriously unfriendly to shipping, for cold and ice-filled seas are usual. On the other hand warmer seas relatively free from ice are found on the corresponding western shores. This is an important reason why southwest Greenland has a thriving group of modern communities, while the Baffin Island coast has changed little since the days of the whalers. It may be economically feasible to exploit the ores to be found in the Canadian Eastern Arctic by using stockpiling facilities on the almost ice-free coast of southwest Greenland. This principal lies behind the proposal of shipping Ungava iron ore to a site near Godthaab during the short summer and re-shipping it from there in winter to world markets.

Enough has been said, I hope, to indicate my belief that geographers should now be thinking in broad terms and publishing their conclusions for public discussion. Canada is one of the very few large countries in the world where such broad thinking still has some prospect of being translated into effective plans. When discussing the opening up of new areas with a Soviet economic geographer in April, 1957 (he was brought up in Siberia and was immensely proud of his homeland) he said with real pride "Novosibirsk has grown more rapidly than any North American City. In 1893 a pine forest grew where today there is a city of over 730,000 people". Speaking as I do in Edmonton there is no need to convince an audience of the likelihood of this. Canada and Siberia have at least this much in common, that great cities stand where little tank towns grew ! Yet we also know that the peopling of the Canadian West was achieved at great expense and with much quite unnecessary waste. The Edmonton, Yukon and Pacific Railway which barely extended beyond the city limits is only one example of the grandiose schemes that came to nought. We can no longer afford such youthful extravagance, yet we still have not learned the need for advanced planning of our expanding frontier areas. The far north — the true Arctic — has seen in the past few years a degree of development unparalleled in the whole of its previous history. In terms of human effort and ingenuity, the wealth expended and the areas traversed, the establishment of the DEW line of radar warning stations has been almost unbelievable. Yet the whole vast undertaking has been uncomfortably reminiscent of the Canol Project which I watched stream northward through Edmonton about fifteen years ago. While the DEW line and its concomittant southerly lines are of course infinitely more complex thant that 1943 pipe line, the two had in common a deplorable lack of over-all planning. Each was designed with a limited objective in mind, and being what is I believe familiarly known as a "crash program" was carried through without any consideration for other developments that might be related to it. Each was the acme of detailed planning for a very limited objective. The far North has certainly been opened up in such ways and in a very literal sense much of it has been settled, but one wonders whether the enormous sums of money spent might not also have contributed to the overall betterment of the northern frontier. And, should there be substance in the rumour that, like an out-dated automobile or an early model television set, the completed system is of limited strategic worth, we may pause to wonder whether it is essential to spread confusion throughout the northland for a short-term and possibly passing strategic concept. Is there never to be time for

advanced planning that may take proper and necessary account of the requirement — if indeed there be one — for electronic networks in the high latitudes, but at the same time also take into account the need for well developed civilian air routes, of well located settlements, of suitable harbours, of strategically placed mining communities, which might at the time, and rather less expensively serve also the fluctuating demands of military strategy ?

There has been it seems to me far too much "individualistic" development of the northern part of Canada without due regard for the betterment of the community as a whole. Weather stations were located to meet the needs of one service rather than as scientific stations for many branches of learning, police posts for administration, trading posts for trading only. Here again there is, or should be, ample scope for geographers to pool their talents with administratiors and with other scientists so that the coming development of northern Canada may be reasonably orderly and may not place an unjustifiable burden on those more southerly communities which must meet the cost.

THE WIDE WORLD AS A LABORATORY

Geography is one of the few academic subjects that is necessarily concerned with the whole world, irrespective of nation, bloc, continent or hemisphere. The geographer ranges freely over the globe, whether in the classroom, his study, the laboratory, the map library or while on field work. No other discipline has quite the same constant need for this freedom of movement, and obligation to persist in being universal. To the geographer national boundaries are, as if by definition, only one kind of regional limit, and not necessarily the best or the most lasting. It is his business to know what is over the other side of the fence and he judges what he sees there by the same standards as he does that which lies on his own side.

So the geography teacher whether he be in the elementary school or the university has a special right, and indeed an obligation to keep always in mind the unity and interdependence of the world and its many parts. If he gains from his reading and field studies some insight into the minds of people living in totally different locales and comes to understand something of the forces that bind any group of people to a particular spot of earth they call home or fatherland, surely he has a compelling obligation to make that information known whether by technical or more popular articles, through books, by lectures or in the classroom. Only in such ways can our young people hope to learn today the basic facts and attitudes that may stand them in good stead tomorrow. Geographers are, I have suggested, by the nature of their training and the character of the media they work with, internationally-minded and accustomed to judging conditions in all parts of the world by uniform standards. The geographer is — or should I say, ought to be — a respecter neither of national boundaries, political loyalties or racial, religious and social barriers. As John Wesley claimed so should we, that "The World is my Parish". We may have private reservations about beliefs and practises found here or there in this still extraordinarily complex world, but they must not be allowed to affect our judgement as scientific observers. In this connection we need to be particularly careful to remember that all the world's sinners have not been, by some mysterious alchemy, concentrated between the Elbe River and the Shanghai Bund. We have, above all, to be especially wary that the political and social differences that today separate so sharply one nation from another shall not, if we can help it, be permitted to create barriers dividing the world-wide membership of the geographical profession.

IMPRESSIONS OF EASTERN EUROPE

Following this line of thought I would like to devote the remainder of my time this evening, to comments based on a short visit paid to parts of Eastern Europe and the U.S.S.R. in 1957.[10] Canadians have particular reason to recall how much settlers from these lands have contributed

by their labour, their varied cultures and their outlook on life to be the betterment of this country, and particularly the part that lies between the Great Lakes and the Rocky Mountains. This makes a Canadian particularly welcome in eastern European countries. When visiting the Geography Department of the University of Kharkov in the Ukraine, and in conversation with the Rector of the University, it was soon apparent that some familiarity with the lives of Ukrainians in Canada proved to be a strong link with their old homelanad today. In spite of the passage of years and the widely different economic systems, one felt almots at home in that distant land, and realized that southern Manitoba and the Ukraine still have in common more than just wheat farms anad chernozem soils.

This is an appropriate time to pass on to members of the Canadian Association of Geographers, greetings that were offered by our colleagues in eastern Europe. General Kolarik, President of the Geographical Society of Czechoslovakia, kindly attended my lecture in the Charles University of Praha; he expressed the formal thanks of his Society and asked me to bring his greetings to this Association. Farther east came a message from Professor Leszczycki, of the University of Warsaw, from several geographers in the University of Leningrad and from the Geographical Faculty at the Hertzen Pedagogical Institute of the U.S.S.R. there. It is in this Institute that the well known Faculty of Peoples of the North is now housed. In the same city, greetings were received from the Arctic Research Institute of the U.S.S.R. a part of the Northern Sea Route Authority. This large and active organization includes many geographers on its staff. From the Institute I brough back an unusual souvenir, demonstrating that Canada and the Soviet Union are nearer to one another than is generally recognized! This was a photograph of an RCAF "Lancaster" ice-reconnaissance plane, taken some miles north of Ellesmere Island from an ice-reconnaissance plane of the Soviet Arctic Institute. The official who took the photograph, asked me to see that it reached the Canadian pilot, for whose skill he expressed the greatest admiration.

From Moscow there came many message of greeting, and I should like to mention here one from the Director of the Geographical Institute of the Soviet Academy of Sciences, Academician I. P. Gerassimov. He is already known to several Canadian geographers from his attendance at conferences in Brazil, India and Japan; a few weeks ago he was a guest of the Royal Geographical Society and the Royal Society in London. The veteran economic geographer Professor N. N. Baransky also wished me to salute you; partly because as a native of Siberia he feels a particular affinity for Canadians. Some of us were delighted to welcome to Canada last winter one of his students, Mr. Lev Karpov.

In far away Central Asia, where the glaciers of the Tien Shan phovide the water that makes a busy life possible in an otherwise arid region, I received a particularly generous welcome from geographers at Alma Ata. They pointed out that a slide I used showing the Rockies as seen across the plains and foothills of southern Alberta was remarkably like the scene from their own Geographical Institute, looking toward the Trans-Illi Alatau Mountains. Because of the similarity of their location and the many parallels in their interests, an exchange might usefully develop between the geographers of Alberta and southern Kazakhstan. At Tashkent farther to the west, where geographers are also closely concerned with glaciology, the utilization of mountan water, and the many problems of cultivating the loess steppe lands, I was also made to feel at home. A reminder that the world of scholarship is smaller than we think, was the fact that the President of the Uzbek Academy of Sciences, a distinguished geologist, and I were able to compare impressions of the scenery around Sondrestromfjord in West Greenland, which both of us had visited the previous summer — he while using the polar air route to attend an international geological congress in Mexico.

Of the links between Canada and the Ukraine I have already spoken. A west-

ern Canadian university offering special work in the Slavic languages might consider the possibility of initiating exchanges with the University of Kharkov.

From three weeks spent travelling in Hungary on the invitation of the Academy of Sciences and the Hungarian Geographical Society I brought back many warm messages of greeting not only from university geographers, but also from the general public who have a deep feeling of gratitude for the extraordinary generous welcome given their refugees by Canada following the tragic events of late 1956. The Hungarian Geographical Society through its President Professor Laszlo Kadar of Debrecen, asked me at a public lecture in Budapest to bring to you the members' greetings, and this I have particular pleasure in now doing.

SOVIET GEOGRAPHICAL EDUCATION

Without at this time attempting to detail the many interesting aspects of Soviet education in Geography, it may be useful to touch on a few of the highlights that seemed outstanding during a rather hurried visit.

The first and most obvious comment, but one that may need to be made, is that academic standards at schools and universities are in no way below those of North America, and in some ways are superior. The competitive nature of the Soviet educational process means that the training offered is perhaps more thorough, though it may be somewhat narrower than ours. The basic school system in cities of the U.S.S.R. covers ten years, and geography plays the important role in it that is usual in Europe. There seems to be a trend in eastern European countries towards standardization of educational methods along Soviet lines. In Czechoslovakia and Hungary, and possibly elsewhere, this is unlikely to lead to a rise in quality, in fact it may have the opposite effect. One suspects that the Hungarian universities, for example, cannot for many years, if ever again, achieve the very high standards for which they were famous. Many of their best students fled in 1956 and the institutions and their staffs have been under considerable political pressure from the authorities since the Spring of 1957.

There is of course a strong tendency toward use of Russian as the second language throughout eastern Europe, although it does not appear to be a popular move. One can only hope that there will be no corresponding decrease in study of English and German, since these are the only means by which contact can be maintained with western thought. In the Soviet Union itself, the teaching of English is being emphasized, and the success of this is apparent in schools and universities. I returned from Europe more than ever convinced that a sound knowledge of foreign languages is absolutely essential for Canadian geographers. It should become routine that no student may receive an honours degree in geography without a good knowledge of at least French, and possibly another language as well. Russian certainly merits attention. The present regulations which require reading knowledge of a foreign language at the Ph.D. level are at best nominal. The solution lies with the undergraduates. This is a matter on which this Association's Educational Committee might well have recommendations to make.

The five-year university course in geography in the Soviet Union is a highly specialized one. This is particularly apparent to American visitors since their colleges and universities traditionally encourage a good deal of casual wandering in the academic groves in search of something interesting to specialize in. The Soviet student usually enters the university with his mind already made up about a career. After one year or possibly eighteen months of general geography, students are attached to the particular chair or division of their choice. At the University of Moscow the Geographical Faculty includes more than a dozen such chairs each under the supervision of a professor with an international reputation. The physical resources of the Faculty are outstanding. Whether the student is to specialize in cartography, climatology, economic geography, the polar regions, oceanography or some other

phase he or she (and there is a high proportion of women students) receives a thorough, if perhaps rather old-fashioned schooling, by means of lectures, laboratory work, broad reading, field excursions and extended field trips and field camps. Summer field work is arranged on a graduated scale so that, while after the freshman year part of the summer is spent at one of the universty's three permanent field stations, succeeding summers are occupied by more thorough field instruction, until finally between the fourth and fifth academic years the student is considered a fully qualified field worker able to undertake responsibility often in the most distant parts of the country. Thus he may serve on an arctic ice-breaker, be engaged on preliminary regional surveys for a new hydro-electric development near the mouth of the Ob River, or aid in work under the I.G.Y. programme on the Fedchenko Glacier in the Tien Shan, or he may be concerned with working out details of the economic regions of some part of European Russia. It is in this final field season that he secures the material needed for his graduation thesis. Following graduation a small proportion of the students may continue studies for a further three years leading to the Candidate degree. It was as a result of work on a thesis on the economic geography of British Columbia for this degree that Mr. Lev Karpov visited Canada last winter.

Upon graduation students are normally obliged to serve for three years, at the usual salary rates, in some post to which they are allocated, or which is offered to them. Thus a graduate may continue working at the site of his last summer field project or at least for the Trust or other body that employed him. There appears to be no lack of demand for trained geographers to fill positions at research institutes comparable with the Geographical Branch in Ottawa, at planning institutions, in connection with the many large-scale public works that are continually being started, and as teachers in the secondary schools. The profession of geography is highly esteemed in the U.S.S.R. and I came away with the impression that its members well deserved the status they have achieved.

At my lectures, in many interviews, on visits to laboratories and classrooms, Soviet geographers struck me as being alert, well-qualified, most anxious to keep themselves fully informed about developments in their fields abroad, and ready to let us know of the results of the projects they are themselves engaged on. Study of their many published reports reveals significant work of high quality. There is a systematic programme of translation of fereign books into Russian — they are most anxious to translate standard Canadian geographical works — and a number of Soviet texts are translated into English for sale abroad. An excellent system exists for circulating abstracts of foreign scientific publications.

While the visitor receives an extremely warm welcome, it is still not possible for him to move freely about the country. My own hopeful plans for seeing something of the Soviet Arctic came to nought, although it did prove possible to visit parts of Central Asia. Travel now seems to be rather freer than it was a year ago, but one needs to recognize that Russia has never enjoyed the degree of uninhibited freedom to wander that we are accustomed to. There may long remain curbs that will prove irksome to any geographer. So one must travel hopefully even if one does not always arrive, trusting that generous treatment offered to Soviet scientists who visit Canada will in time bring as generous a response.

EXCHANGES WITH CANADA

May I express a hope that in spite of very real problems on both sides there may soon develop between Canada and the countries of eastern Europe, not least the U.S.S.R., a thorough-going exchange of persons? To an audience of geographers it is naaural that one should stress the advantages of exchanges of scholars — students, research workers, teachers and so on. While such interchanges are clearly very desirable in all fields of knowledge, they are particularly easy to justify in the case of geography; while the principles by which we work are world-

wide, their discovery and application call for direct knowledge of particular regions. So, mindful of the warm welcome I received in eastern Europe a year ago as an officer of this Association, I would like to plead for an early and extensive exchange of geographers and of geographical publications, including, of course, maps. Travelling to and within the U.S.S.R. is unavoidably expensive, and the cost normally cannot — and should not — be met by individuals themselves. This is where institutions and especially Foundations should be really generous with grants in aid. Government exchanges will and should take place by official arrangement — doubtless in accordance with the by now sacred rules of "reciprocity", if not "an eye for an eye" at least one hockey player or trombonist for another hockey player or trombonist. The governments will doubtless in time take care of their own official needs. I would urge those who command the necessary funds to realize that there is nothing quite so powerful as a free man speaking freely to a sympathetic audience, and that academic people — who are looked on with great respect in eastern Europe — should be aided and encouraged to go abroad in their own unfettered way.

There is of course likely to be some residue of cautious watchfulness between these lands and ourselves for years to come, so no traveller moving either way is likely to be entirely above suspicion, least of all perhaps a geographer with maps, a notebook and a camera — and I say this as one of the many enquiring westerners who has spent a short sojourn in a Soviet guardhouse for inadvertently photographing the "unphotographable", but the university scholar, the teacher and the student, is probably as sure of a real welcome as anyone else, and likely to make a better impression than some. May I add a modest suggestion for anyone who is planning to visit the Soviet Union. We all know the fatal tendency of visitors to remain in the capital city, believing they are seeing the country at large. No Westerner needs to be told that Ottawa is not Canada. Likewise Moscow is not the Soviet Union, as many a university geographer in the more remote hinterland will tell one. May I therefore suggest that in planning a Soviet visit the geographer should, in addition to paying his respects at the customary national shrines, travel to some part of the country that has a special interest for him. He will receive a welcome all the warmer because of the rarity of the scholarly visitor, and in thanks for the specialized knowledge he brings with him. Having felt most welcome of all near the Chinese border at Alma Ata, I am ready to believe that anywhere between Petchenga and Vladivostok that is open to the casual wanderer, should prove as good a goal as anywhere else.

Meanwhile, while awaiting the large grants that would make such interchanges of persons possible, the Canadian Association of Geographers should be ready to expend some of its own all too limited funds to further the exchange of its journal with Soviet and eastern European universities which might be expected to have an interest in things Canadian. This will prove, I believe, to be bread cast upon the waters. University geography departments, and schools in Canada where the teaching of geography is particularly well established might themselves make direct contact with corresponding institutions in the U.S.S.R. or some neighbouring land. Interest in scholarly affairs in the West cannot long remain alive without continuous contacts with our work and ideas. The initiative to provide these contacts, must for the present be taken largely by us. It is my firm conviction that though the response may not be immediate, the effort will in the long run prove very worthwhile.

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6. For lack of a better term, this is intended to describe those engaged in education who have specialized in the techniques of teaching or in educational administration, rather than in the subject matter being taught.
7. The speaker's view on the content and approach needed in Canadian school goegraphy textbooks have been incorporated in a series prepared in collaboration with Professor Griffith Taylor and Miss Dorothy Seiveright.
8. In May 1958 a group of Calgary high school teachers recommended to the Cameron Royal Commission on Education the separation of history and geography in the elementary and intermediate grades. Their arguments favouring this appear to parallel my own.
   The Yearbook of the National Council for the Social Studies for 1959, entitled *New Viewpoint in Geography*, is a strong endorsement of the need for strengthening the independent teaching of geography in the elementary grades.
9. Fifteen per cent was a popular item when the address was made — it represented a desirable goal for some in the reduction of Canada's trading dependence in the United States.
10. The journeys referred to here took place in March, April and July 1957 and covered parts of Czechoslovakia, Poland, Hungary and the U.S.S.R. Not discussed at this time are other journeys made between February and September of that year in the United Kingdom, Denmark, Norway, Sweden, Finland, Belgium, France, West Germany and Austria. I am grateful to Dartmouth College for a sabbatical leave that made these travels possible.

LA COMMISSION INTERNATIONALE DE GÉOMORPHOLOGIE PÉRIGLACIAIRE ET LE CANADA

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ABSTRACT. *The I.G.U. Commission on Periglacial Morphology was set up in* 1949 *and its first report was presented to the* 17*th Congress in Washington in* 1952. *Between* 1952 *and* 1956, *the Commission published a select bibliography on periglacial phenomena and a few national maps were produced. A short study on Canadian periglacial morphology appears in the general report to the* 18*th Congress in Rio de Janeiro in* 1956. *From that date Canada has been represented on the Commission, which has met in Spain and Poland. During* 1959, *a national map of Canadian periglacial phenomena will be prepared for presentation at the* 19*th Congress in Stockholm in* 1960.

Cette Commission de l'Union Géographique Internationale a été créée à Lisbonne en 1949; elle consacrait le développement réalisé par les études des phénomènes cryergiques depuis 30 ans et surtout depuis 10 ans. Monsieur l'Ambassadeur H. W. Ahlmann fut le premier président de cet organisme qui comprenait alors Kirk Bryan, H. Poser, A. Cailleux et d'autres; les 12 membres étaient soit titulaires soit suppléants. Après s'être réunie deux fois, la Commission a déposé son rapport[1] au Congrès de géographie de Washington en 1952. Des 12 études régionales publiées, aucune ne concernait le Canada.

La Commission s'est alors réunie en 1952 dans la capitale états-unienne pour des motifs scientifiques et administratifs. Six textes ont été présentés; tous, sauf un, concernaient le périglaciaire régional.[2] Sur le plan administratil, MM. André Cailleux et Jean Tricart se voyaient respectivement confier les postes de Président et de Secrétaire. Le nombre total des membres de la Commission passait à 15. Le Canada n'a pas encore de liens officiels avec la Commission[3].

De 1952 à 1956, la Commission a été très active. Une de ses initiatives a été de publier des fiches bibliographiques qui ont d'abord été distribuées à 150 exemplaires. De plus elle a demandé de préparer des cartes periglaciaires et des rapports à l'échelle nationale; quoique la plupart des pays intéressés aient répondu en produisant des cartes périglaciaires régianales, certaines contrées ont bâti des documents embrassant l'ensemble de leur territoire[4]. C'est aussi durant cette période qu'est apparu, en 1954, le premier périodique consacré exclusivement aux questions cryergiques: *Le Biuletyn Peryglacjalny* publié a Lodz, Pologne[5].

Le Congrès de Rio de Janeiro en 1956 a permis à la Commission de faire une deuxième réunion générale. A cette occasion, l'on a publié, par les bons soins du *Biuletyn Peryglacjalny*[6], 14 importants rapports régionaux dont le premier traite du Canada[7]. Durant le Congrès, quelques autres communications traitant du périglaciaire ont été également présentées[8]. Par ailleurs, des spécialistes du relief cryonival ont entrepris l'étude de l'Itatiaia[9]. A cause de son excellent travail, la Commission a vu son mandat renouvelé. Suivant les habitudes, l'on a nommé pour 4 ans de nouveaux membres: MM. Jan Dylik et René Raynal deviennent président et secrétaire. Le nombre total des membres passe à 21 dont un Canadien[10].

Au cours de l'été 1957, le Secrétaire est allé en Pologne rencontrer le Président de la Commission. Lors de cette rencontre, un programme détaillé en 4 points a été discuté[11]. On y présente d'abord le *Bilan* des recherches; puis, l'on définit des *problèmes généraux*: inventaire des formes de relief, sédimentologie, processus, bibliographie, terminologie, cartographie, application pratique; les auteurs parlent ensuite des *problèmes régionaux*: régions périglaciaires pléistocènes, zones périglaciaires mondiales; ils terminent enfin en donnant des indications sur *l'organisation du travail*.

Le Congrès de l'INQUA tenu en Espagne à la fin de l'été 1957 a permis aux membres titulaires réunis de se prononcer sur le programme qui est discuté et adopté. Le Congrès lui-même a été une occasion supplémentaire d'entendre des communi-

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cations[12] et d'entreprendre des recherches sur le périglaciaire général et espagnol. Afin de faire connaître au Canada le programme de la Commission, nous en avons fait une présentation au Congrès de l'ACFAS à Québec en novembre 1957 et un court texte a été imprimé par la suite[13].

Lors de la réunion de Madrid, les membres ont reconnu la nécessité de se rencontrer plus souvent. La session suivante a été fixée du 16 au 30 septembre 1958 en Pologne, particulièrement à Lodz où enseigne le Porfesseur Jan Dylik, président de la Commission. Grâce à de généreux crédits de l'Académie des Sciences de Pologne, du Comité polonais de l'U.G.I., de l'Union Géographique Internationale elle-même (et en ce qui nous concerne, de l'Université Laval), 15 membres titulaires, correspondants ou invités, ont pu assister à cette intéressante réunion. Les géographes polonais méritent les plus grands éloges pour avoir préparé ce symposium-excursion sans égal a tous points de vue: pour nous en tenir à quelques aspects scientifiques, rappelons que l'on a publié un numéro spécial du *Biuletyn Peryglacjalny* et que l'on a distribué aux congréssistes des documents extrèmement détaillés sur le périglaciaire polonais. La réunion a consisté en trois parties distinctes dans l'ordre chronologique: d'abord, des *séances académiques* ou des communications ont été entendues pendant deux jours à l'Institut de Géographie de Lodz; l'on y a remarqué entre autres textes de MM. Dylik et Raynal sur les éboulis ordonnés. Tous les articles et un compte rendu des discussions seront publiés sous peu dans un autre numéro suécial du *Biuletyn Peryglacjalny*. La deuxième partie a été une *excursion* de 12 jours qui a conduit les participants de la Baltique aux Carpathes; cette excursion qui avait été parfaitement préparée illustre à la fois la haute compétence des Polonais et les remarquables phénomènes de sédimentologie périglaciaire en Europe centrale. Le troisième événement a été la *réunion* administrative des membres da la Commission à Zakopane dans les Tatras. L'on a réaffirmé les objectifs principaux, à savoir la préparation 1- des cartes périglaciaires nationales et 2- des communications d'envergure sur les thèmes fondamentaux déjà définis par la Commission. Afin que ces travaux soient définitivement prêts pour le Congrès de Stockholm, en 1960, le professeur K. K. Markow de Moscou a suggéré de présenter une ébauche de ces travaux lors da la prochaine réunion de la Commission que M. Raynal organisera au Maroc en octobre 1959. Il a été aussi décidé de nommer des membres "nationaux" qui aideraient à réaliser le programme de chaque pays[14].

Malgré d'excellentes études isolées [15] et se rapportant à l'Arctique, le Canada est en retard dans l'inventaire de son patrimoine périglaciaire. La Commission pourrait alors aider les chercheurs individuels à accélérer la découverte des processus, sédiments et formes périglaciaires. A cet effet, elle va nommer au Canada des membres nationaux; quelques-uns ont déjà été pressentis. Ces personnes peuvent travailler avec nous ou directement auprès du Secrétariat de la Commission, au relevé systématique des formes, a l'établissement de fiches bibliographiques, aux définitions terminologiques françaises et anglaises, à l'étude des processus, à l'établissement de cartes très précises sur une étendue restreinte, et aux applications pratiques.

Il faut faire tout cela rapidement si l'on veut que, de ces études de détail, sortent pour 1960 des cartes périglaciaires zonales du Canada.

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MINERAL REGIONALISM OF THE CANADIAN SHIELD *

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ABSTRACT. *Exploitation of minerals on the Canadian Shield has progressed rapidly in the twentieth century with mineral output expanding from less than $15,000,000 annually at the turn of the century to over $800,000,000 in 1956. For more than a half century areas dominated by a mineral economy have increased in number. Consequently there are some mineral regions on the Canadian Shield that are in an initial stage of exploitation while other areas are declining due to mineral exhaustion.*

Mining regions change through time just as do other regions. The mineral region of the Canadian Shield normally begins as a single node of mining activity. If new centers of mining develop around the original node a dispersed mineral region forms in which there is considerable open space. With the development of a closer knit pattern of mining activities a uniform mining region evolves. Each of these regional types has characteristic features and problems of development.

It is the purpose of this paper to describe and analyse the characteristics of the different stages in mineral regionalism of the Canadian Shield. Such aspects are investigated as production and reserve trends, localization of the processing facilities, problems of establishing a mining economy in a subarctic environment, similarities and contrasts of the mining landscape in different stages of exploitation, population patterns and contrasts in the composition of population between mining and non-mining communities, and the interplay of the mining processes with other elements of the economy. Because there are many regions dominated by minerals in different stages of development, the Canadian Shield presents an ideal area for the study of mineral regionalism.

RÉSUMÉ. *Le bouclier canadien a connu une telle expansion économique que sa production minière annuelle a passé de $15,000,000 près au tournant du siècle, à plus de $800,000,000 en 1956. Depuis plus d'un demi-siècle les régions minières ont augmenté en nombre; plusieurs en sont qu'au stade initial de leur exploitation, tandis que d'autres entrevoient déjà l'épuisement prochain de leurs ressources.*

La région minière du bouclier a à son origine qu'un seul noyeau d'activité autour duquel, s'éparpillent parfois d'autres agglomérations minières. L'évolution de la région amène éventuellement un resserement de son activité et une plus grande uniformité régionale.

Le but de cet article est de décrire et d'analyser les caractéristiques du régionalisme minier dans le bouclier canadien. Ainsi, les divers courants de la production et des réserves, les emplacements des usines métallurgiques, l'adaptation de l'économie minière aux exigences subarctiques, les similarités et contrastes du paysage minier dans ses divers stades d'exploitation, la répartition et la composition de la population, et finalement, la relation entre l'exploitation minière d'une part et les éléments de l'économie environnante de l'autre, voilà autant d'aspects qui méritent d'être examinés. Parce que l'industrie minière s'avère d'une très grande importance dans tout développement de caractère régional, le bouclier canadien est l'endroit idéal pour toute étude sur ce sujet.

The Canadian Shield, once regarded as a wilderness of forests, lakes and rivers inhabited by fur traders and a few bands of Indians and Eskimos, is today of major economic importance, not only to Canada, but to the world. Although many factors have contributed to the economic growth of Canada, without the mineral wealth of the Shield, Canada's economic advancement would not have been so rapid.[1] The role of the Shield has changed from that of a handicap to that of an asset in the national life. Of a total mineral production in Canada in 1956 of $1,054,767,108, over $816,257,000, or 77.5 per cent of Canada's total mineral output, came from the Canadian Shield.

The modern mining industry began in 1883 with the discovery of the nickel-copper ores at Sudbury (Figure 1). The development of the mining economy was slow for by 1929 only seven mining districts had developed on the Shield. Many factors hindered rapid exploitation of the mineral wealth. The rigorous climate largely limited exploration and development to a few summer months. In the southern portion of the Shield, which was most accessible, a dense forest and brush covering mantled the rock surface. The mineralized character of the ore deposits retarded development for the metal content of the ore was low. For example, two to five tons of igneous rock had to be processed to obtain a single ounce of gold.

* Based on a paper presented at the 54th Annual Meeting of the Association of American Geographers, Los Angeles, California, 1958. The writer wishes to express his appreciation for aid granted by the College of Mineral Industries of the Pennsylvania State University and to Joseph Gregory, graduate assistant in the Department of Geography of the University, who drew the original maps.

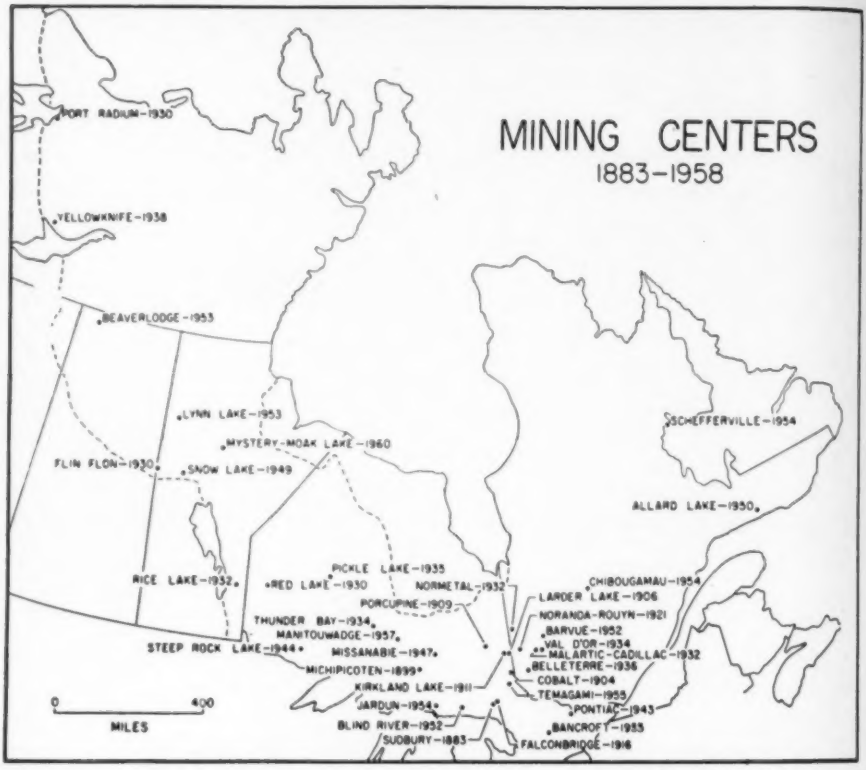

FIGURE 1. The mining activities of the Canadian Shield are concentrated in the southern portion and on its periphery. The date indicates when mineral production began.

Once a mineral deposit was discovered the development of the mining district was difficult for the area was completely virgin country. Because all men and supplies had to be assembled from outside, accessibility to railroad transportation was absolutely necessary to the opening of a new mining area. If in the construction of the railroad through the region, major mineral deposits were accidentally discovered, the mineral economy was immediately inaugurated. If, however, the mineral discoveries were far from existing railroad routes, and since mining was essentially the only economic activity served by the railroad and construction was costly, railroads could only be built to major deposits. As late as 1929 only a dispersed mining region had developed in eastern Ontario and western Quebec.

The second period from 1930 to about 1943 was dominated by development of gold mining in widely separated areas. In 1930 there were 16 gold mines on the Shield. This number rose to a peak of 106 by 1942. Base metal development during this period was limited. The concentration on gold mining was primarily due to three factors.[2] The airplane, providing a more easy access to isolated areas, played a major role, not only in exploration, but as a transporter of men and equipment to newly discovered gold mining centers. The gold having low bulk and high value could also be ship-

ped by air. The general economy of the 1930's also favored gold mining. With the onset of the economic depression, the price of commodities needed for development purposes declined, but the purchasing power of gold, stabilized at $35.00 per ounce, rose. The gold mines, thus, benefited doubly; the costs of operation decreased and income increased measured in terms of purchasing power. Finally, in the early years of World War II, the demand for gold as a medium for paying the purchases of Canada in foreign countries gave a considerable importance to gold mining. However, by about 1943 priorities for men and equipment for war purposes placed gold mining in an inferior position. Development work was curtailed. Other minerals were sought, which could be used directly for war goods.

The present period dates from about 1944. It is characterized not only by an expanded mineral output but by production of a greater diversity of minerals. From 1947 to 1956 the output of copper on the Shield increased from 204,962 to 328,272 tons, cobalt from 286 to 1,843 tons, gold from 2,722,116 to 3,732,474 fine ounces, iron ore from 1,713,720 to 11,767,920 tons, zinc from 81,360 to 152,630 tons, and nickel from 118,626 to 177,993 tons.

The increasing demand for minerals, not only in Canada, but on the world market, has been the greatest influence in the expansion of mining on the Canadian Shield in recent years. Combined with the rising consumption rate is the factor that many of the more accessible deposits of the world are nearing exhaustion and new supplies are being sought in remote areas. During the period 1944 to 1958 at least 14 new mining districts came into existence, and a number of significant new discoveries were made. Of the minerals produced in Canada in 1956, 89.8 per cent of the iron ore was exported, 99.3 per cent of the nickel, 91.7 per cent of the zinc, 74.2 per cent of the cobalt, and 68.2 per cent of the copper.

MINERAL REGIONS

The mineral economy of the Canadian Shield developed by the establishment of individual districts of mining activity. In this study a mineral district is defined as an area with one or more mines providing the basis for the development of a local mineral economy. In 1957 there were 34 active mineral districts. On careful observation of these mineral districts, certain groupings can be detected forming regions possessing distinct characteristics (Figure 2). In western Quebec and eastern Ontario the 15 districts are so closely spaced that they form a unified mineral region. This area is designated the Ontario-Quebec Metals Region.

In western Ontario and in central Manitoba there are two groups of dispersed mineral districts. Although the individual districts are separated, spacial cohesion is achieved by similarities in the mining activities and the districts are tied together by a sparse transportation network. These dispersed regions have been designated the Manitoba - Saskatchewan Metals Region and the Western Ontario Metals Region. There are also isolated centers of mining activity where a single district exists. Six of these — Port Radium, Yellowknife, Beaverlodge, Bancroft, Allard Lake and Schefferville — are major centers of mining activity.

ONTARIO-QUEBEC METALS REGION

The Ontario-Quebec Metals Region is one of the world's major areas of mineral production.[3] The 15 producing districts had an output of $694,000,000, in 1956, or 72 per cent of the mineral wealth of the Shield.[4] Although emphasis has been placed on recovery of all metals in the ore, the output of three metals predominates. Nickel provided about 30 per cent of all mineral wealth based on value; copper was second with 27.7 per cent and gold was third with 16 per cent of production.

Of the 15 districts, Sudbury alone produced 71.3 per cent of the mineral output of the region (Figure 3). Nickel and copper provide nearly 80 per cent of output, but other minerals include platinum, gold, silver, palladium, and iron ore.[5] The attempt to recover all minerals in the ore is well illustrated in the growing

utilization of the iron ores. As much as 1,000,000 tons of iron ore a year will come from the treatment of nickel bearing pyrrhotite. This ore was previously discarded at the processing plant at Copper Cliff. Mining in the district comes from 13 mines, 12 of which are underground and one is an open pit operation. Ore reserves in the Sudbury areas totaled 311,407,489 tons in 1956 with nickel-copper content averaging from one to three per cent. Exploration work is still in progress and several centers are in the initial stages of development.

Northeast of Sudbury lies the Cobalt District (Figure 1). From 1903 to the late 1930's this was a major silver camp, but with the gradual depletion of the silver ores, metal output declined greatly for about a decade.[6] With the development of cobalt-base alloys used in jet and gas-turbine engines and in guided missiles, and cobalt's use af a radio-isotope for treating cancer, mining in the area has been revived.

To the north of the Cobalt District the nine districts extending from Porcupine, Ontario on the west to Val d'Or, Quebec on the east could well be designated the gold-copper belt (Figure 3). The gold districts of Porcupine, Kirkland Lake and Larder Lake in Ontario are among the largest gold producers in North America.[7] Of these the Porcupine District is largest with the gold output from his discovery in 1909 to 1957 valued at $1,300,000,000. In 1957 the three areas produced 1,895,514 fine ounces of gold from ore with a gold content ranging from 0.245 to 0.323 fine ounces per ton. Eastward in Quebec, copper as well as gold and a number of other minerals become important. In the Noranda-Rouyn District, copper is the major mineral and gold a valuable by-product.[8] The reserves of copper sulphide ore in 1956 at the

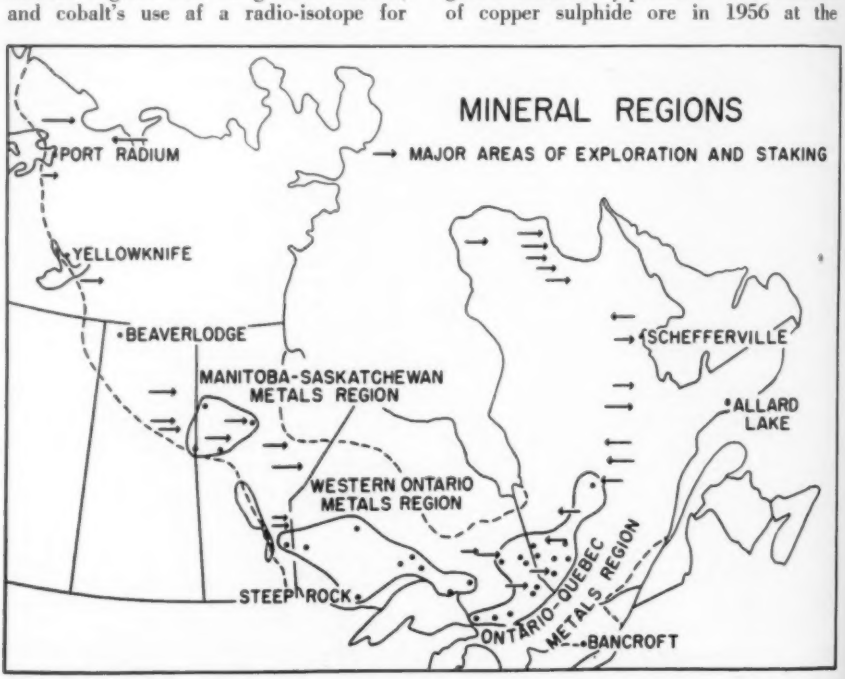

FIGURE 2. Three major mining regions and a number of isolated districts are now in existence on the Canadian Shield.

Horne mine at Noranda, the largest of the district, were 11,567,000 tons averaging 2.29 per cent copper and 0.187 fine ounces of gold per ton.

Eastward the Malartic-Cadillac and Belleterre Districts are major gold producers. In the Val d'Or District three mines produce gold primarily, and two produce copper, zinc, silver, pyrite, and lead as well as gold. On the northern edge of this belt the Normetal District is primarily a producer of copper and zinc. Ore reserves are reported as 3,735,000 tons averaging 2.47 per cent copper and 7.71 per cent zinc. The Barvue District, developed since 1952, produces zinc, silver and some lead. Molybdenum is produced from the LaCorne mine, the only Canadian source, about 25 miles northwest of Val d'Or.

Possibly the mineral receiving the greatest attention since World War II has been uranium in the Blind River District lying on the north shore of Lake Huron.[9] Huge tonnages of ore were discovered in 1952 and production began in 1955. This area has the world's largest known reserve of uranium. It is estimated that from 1957 to 1963 this area will supply in excess of $1,000,000,000 of uranium concentrates. In 1957 twelve mines and 11 mills were operating in the district.

Although the Ontario-Quebec Metals Region is the oldest mining area on the Shield, it remains dynamic, extending its borders outward. A number of new districts are in an initial stage of exploitation. The Chibougamau District, about 150 miles northeast of Val d'Or, became an important copper-gold producer in 1954 (Figure 3). These centers are now in production with a proved reserve of copper ore of 8,231,480 tons with an average copper content of 2.84 per cent. The Temagami District, south of the Cobalt District, began copper production in 1955. The Jardun District, 20 miles northeast of Sault St. Marie, began production of lead, zinc and silver in 1954. There are also many occurrences of minerals that have not been exploited to dale.

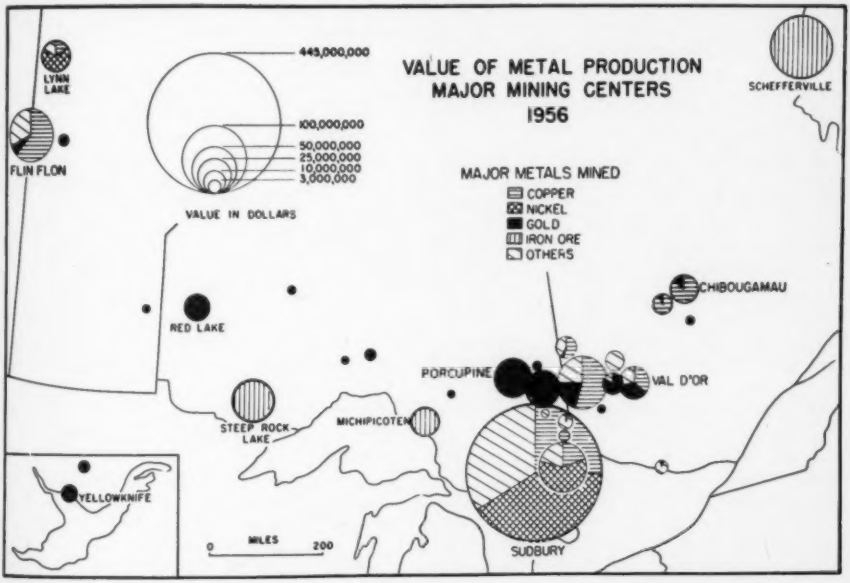

FIGURE 3. Copper, nickel, gold and iron ore are the major metallic minerals exploited on the Canadian Shield.

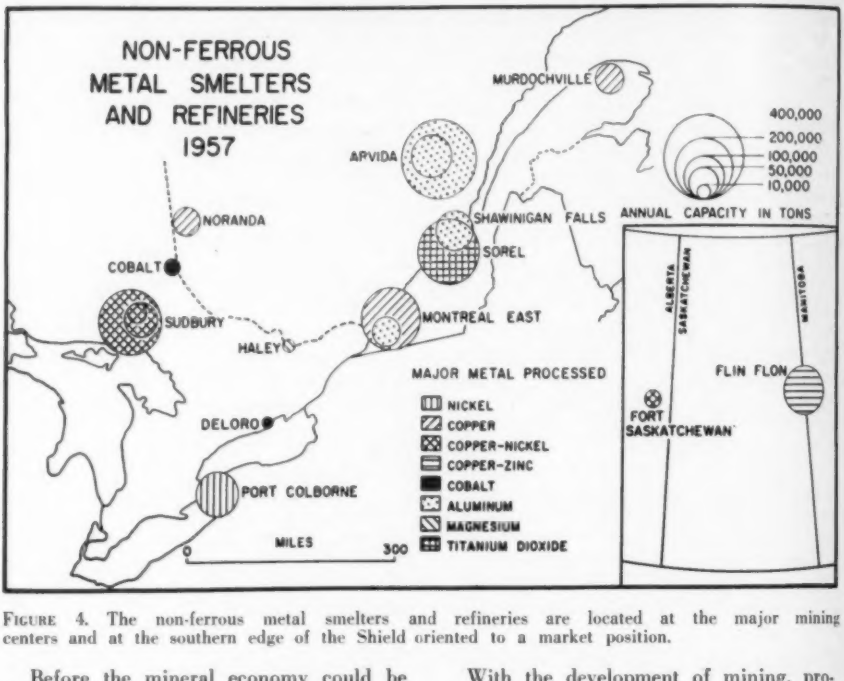

FIGURE 4. The non-ferrous metal smelters and refineries are located at the major mining centers and at the southern edge of the Shield oriented to a market position.

Before the mineral economy could be initiated a source of power had to be provided to operate the mining machinery. From an early date the mining industry of the Ontario-Quebec Metals Region has depended for its power from hydro-electric sources. On the whole this district is well endowed with water power resources, having abundant precipitation with numerous rivers and lakes located in areas where the topography favors water power development. It is particularly fortunate that this area, which has no fossil fuels, has a high potential of hydro-electric power. To serve the mining industry, 31 hydro-electric power sites have been developed.[10] A network of hydro-electric power lines connects the mining districts with each other. It has been estimated that the cost of hydro-electric power in the Shield is 50 per cent lower than if the power had to be provided from coal. In northern Ontario the value of electric power used in 1958 was approximately $15,000,000.

With the development of mining, processing of the ores began in the region. The universal practice with gold bearing ore is to treat the ore and recover the metal at the mine site. With growth of base metal mining, smelters were established to reduce the bulk of the low metal content ores (Figure 4). These smelters are, thus, raw material oriented. The major smelter center is at Sudbury where three copper-nickel smelters are located. The two smelters operated by the International Nickel Company processed 15,510,000 tons of ore in 1956 and the Falconbridge Nickel Mines Limited smelter processed an additional 1,850,000 tons of ore. A second smelter center is located at Noranda for processing the copper ores of the Quebec districts. In 1956 this smelter procuced 101,406 tons of anode copper, 413,390 fine ounces of gold, and 2,280,400 ounces of silver. The newest smelter of the area began operation in 1954 to process the cobalt-silver ores of the Cobalt District.

Because of the tremendous production of copper at Sudbury and the availability of low-cost hydro-electric power, a copper refinery has been constructed in the Sudbury District. However, since little copper is utilized in the region for manufactured products, large quantities of anode copper are sent toward the market to be refined on the southern edge of the Shield. A mammoth copper refinery exists at Montreal East. This plant treats the entire output of anode copper from the Noranda, Flin Flon and Murdochville smelters as well as a small amount of scrap copper. Gold, silver, selenium and tellurium, which are contained in the anodes, are recovered during the refining process. The refinery, with an annual capacity of 275,000 tons of refined copper, is the second largest in the world.

A nickel refinery developed at Port Colborne near Niagara Falls because of available transportation facilities and power supply, and a cobalt-silver refinery is located at Deloro, Ontario. A radium refinery is found at Port Hope. The anode copper produced by the smelter of the Falconbridge Nickel Mines Limited of Sudbury is shipped to the company's refinery at Kristiansand, Norway where there is a plentiful supply of hydro-electric power.

The availability of transportation is a major factor in the development of the mineral economy of the Canadian Shield. The Ontario-Quebec Metals Region has always been favorably situated in regard to railway facilities. In the construction of the Canadian Pacific (1883) and Ontario Northern Railways (1904) through the region, ore bodies were discovered at Sudbury and Cobalt which initiated the mineral economy. The transcontinental route of the Canadian National (1915) crosses the northern portion of the region. From these three basic routes, railroad spurs have been constructed to other mining districts. By 1931 a major spur of the Canadian National extended from Taschereau through Noranda to Kirkland Lake connecting with the Ontario Northern Railway. Later in the 1930's the railroad was extended from Noranda, through Val d'Or to Senneterre. There is also a spur from the Ontario Northern Railway to Timmins and another to Elk Lake. The railroad pattern is still evolving as witnessed by the new route from Beattyville to Chibougamau and extending eastward to the St. John area.

The road pattern developed subsequently to the railroads. The major highways in general paralleled the railroad routes. However, many secondary roads lead into isolated areas. Thus, highways are becoming increasingly important in exploratory work and in the initial developmental period. All major towns are served by air routes, but air transportation, although important, has played a lesser role in the development of the mining economy of this region than in areas where land transportation is lacking or poorly developed.

The population of the Ontario-Quebec Metals Region has grown with the development of the mineral economy. In 1901 the population of the region was but 37,574. By 1956 the number had grown to 359,572. Of this number at least 90 per cent are supported directly or indirectly by the mineral economy. Because metallic mining is concentrated areally, the population is not evenly distributed, but is centered in the individual mining districts. Of those districts, Sudbury is the largest with a population of 112,539 or 31.3 per cent of the region's total.

The concentration of economic activity within small areas is also reflected in the large number of cities and towns in the region. Four cities — Sudbury, Timmins, Noranda and Rouyn — have populations of over 10,000. Malartic and Val D'Or have population betwen 5,000 and 10,000 and 18 towns have population of 1,000 to 5,000. These centers have essentially a single function — mining.

The population of the mining communities of the Canadian Shield exhibits distinct characteristics. The 1956 Census of Canada shows that in the mining communities the male population exceeds the female while in the cities in southern Canada the reverse is normally true.[11] The preponderance of males in character-

istic of young communities in contrast to a larger proportion of females to be found in older centers. There are also an unusually large number of young people in the mining communities.[12] Conversely, the population in the mining centres over 45 years of age is low in relation to the centers in southern Canada.[13] As a consequence there are a larger number of school children in the mining communities which has forced an extensive school building program.

The percentage of people living in the mining communities that are married is less than the percentage of those married in most cities of southern Canada.[14] Although there is a greater percentage of people in the 15 to 44 age group in the mining communities, there are relatively fewer single individuals 15 years of age and over in the mining communities than in most cities of southern Canada.[15] This is an indication that there is a relatively greater number of young married couples in the mining communities. As might be expected from the preceding statement families in the mining communities are generally larger than those in southern Canada.[16]

The Census of Canada of 1951 revealed that the labor force of mining communities has certain definite characteristics. These characteristics are apparent when statistics of the labor force of the mining centers are compared with those of cities in southern Canada. Within the mining communities the families having one person in the labor force are much more numerous than in the non-mining centers. There are normally four to five men employed in the mining centers to every woman. In the cities of southern Canada the ratio is about two men for every woman employed. This characteristic of the labor force in the mining region is due to the preponderance of primary industry, the excess of the male sex, and general lack of jobs suitable for women labor.

An analysis of the percentage of wage earners in various income brackets reveals some economic differences between mining and non-mining centers. In general, wages are higher in the mining communities.[17] In a comparison of mining versus non-mining communities there is very little difference in the level of employment from season to season. This is largely because the mining industry offers steady year-round employment to a large part of the labor force. There is some seasonal shift in labor but the number of men involved is not great when compared with the total labor force. The months of low employment in the mining industry are January, February, March, and April. Employment is highest in this industry in July and August.

The mining economy of the Ontario-Quebec Metals Region has influenced to some degree the agriculture of the Clay Belt of Ontario and Quebec. Primarily as a result of the market in the mining centers there has been a change from general farming to dairying. The larger part of the cash crops also find their outlet in the mineral districts on the southern margin of the Clay Belt. In general the increase in mineral production has been reflected in better business conditions within the Clay Belt. Profitable years in the Clay Belt are closely related to similar times for the extractive industries, and the reverse is equally true. Nevertheless, the market provided by the mining economy has not been sufficient to promote a sound agricultural economy in the Clay Belt. The Clay Belt remains a high-cost agricultural region, and is only partially successful in competing for the market of the mineral centers with the agricultural areas of southern Ontario and the St. Lawrence lowlands.

MANITOBA-SASKATCHEWAN METALS REGION

The Manitoba-Saskatchewan Metals Region, producing about eight percent of the Shield's minerals wealth, is still in the formative stage of development. (Figure 5). The mining industry was long retarded due to lack of transportation. Although a major copper-zinc ore deposit was discovered in 1915 at Flin Flon exploitation was delayed until 1928 when a railroad was built to the area from The Pas about 90 miles to the south.

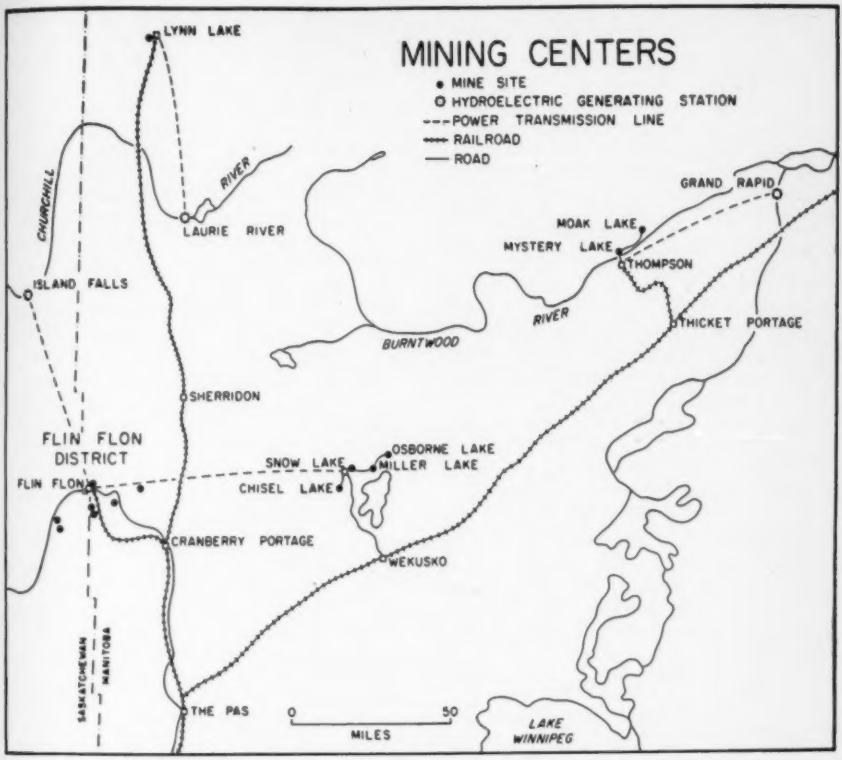

FIGURE 5. The mining districts of the Manitoba-Saskatchewan Metals Region.

The Flin Flon District has developed as the major mining center of the region (Figure 3). At the present time there are seven mines in production, the largest of which it the base metal mine at Flin Flon. On January 1, 1956 the reserves of this single mine were estimated to be 17,638,000 tons of ore averaging 3.24 per cent copper, 3.86 per cent zinc, .073 fine ounces of gold, and 1.02 ounces of silver per ton. In addition, small amounts of cadmium, selenium and tellurium are recovered from the ore.

Since 1945 two new mining districts have come into exploitation and a third is in progress of development. The Lynn Lake District, approximately 250 miles north of Flin Flon, is the first major nickel area of the Shield to be developed outside the Sudbury District.[18] Between 1945 and 1951 initial operations outlined the extent of the ore bodies, determined the proper flotation, leaching and refining processes for the ore, developed the first mines, constructed a power plant on Laurie River 45 miles to the south, extended the Canadian National Railway to the mining center, and planned the townsite. At the time of initial exploitation in 1953 seven ore bodies aggragated 13,820,000 tons of reserve bearing an average of 1.22 per cent nickel and .62 per cent copper. By 1957 the Lynn Lake District was producing at the rate of approximately 80,000 tons of nickel and 12,000 tons of copper concentrates annually.

The Hudson Bay Railway built from The Pas to Churchill, to provide a northern outlet for the Prairie grains, is now providing the basic route for mineral development of northern Manitoba. The Snow Lake District, where gold mining began in 1945, had 300 gold miners in 1957 with an annual payroll of $1,200,000. Until 1956 gold was the only mineral known in the district. As a result of exploration a major zinc deposit associated with silver, gold and lead ores has been discovered five miles southwest of Snow Lake at Chisel Lake and large copper ore bodies have been found at Osborne and Miller Lakes east of Snow Lake. The base metal production of the district began in 1958.

The most recent mining development centers in the Moak-Mystery Lake District about 200 miles east of Flin Flon and 35 miles north of the Hudson Bay Railway. The International Nickel Company has discovered a huge ore deposit which will become the second largest nickel mining area in the world. The nickel ore body extends 80 miles in length and is up to ten miles in width. Target date for production is 1960, when an estimated 130,000,000 pounds of nickel will be produced annually, approximately 40 per cent of Canadian output.

To initiate the mineral economy of Flin Flon a smelter was needed to process the low metal content ores at the mine. (Figure 5). This mammoth smelter now processes not only local ores but the base metals ores from the Snow Lake District. At Lynn Lake a mill concentrates the nickel ore before it is shipped to a smelter at Fort Saskatchewan, Alberta where nickel production is being maintained at the rate of 20,000,000 pounds per year. The copper concentrate is shipped to the Noranda smelter at Noranda, Quebec. A smelter is in process of construction in the Mystery-Moak Lake District.

The Manitoba-Saskatchewan Metals Region now possesses a population of about 18,000 of which 14,000 are in the Flin Flon District. Flin Flon reflects the typical development of the older mining community on the Canadian Shield. Until World War II the town exhibited little of permanence. The majority of the miners came for a "grub stake" and looked forward to moving on in a few years. Consequently, few of the miners were interested in building substantial houses or in civic improvements for the town. Since World War II the miner has come to look on Flin Flon as his permanent home, and pride has been taken in creating an attractive community. There are now many fine homes and public buildings in Flin Flon. However, Flin Flon remains a mining town with essentially no other economic activities to support it.

The new mining communities are small, but growth is rapid. No area on the Canadian Shield better illustrates the modern development of a new mining community than that of Thompson in the Mystery-Moak District. The International Nickel Company (Inco) began in 1957 to developed a government administered town-site for 8,000 persons, including a permanent working force of 2,000. Inco will provide school, hospital and other services. To serve the town and the mining economy a railroad spur is being laid from the Hudson Bay Railway. Coincidental with these developments the Manitoba Hydroelectric Board is constructing a major power dam on the swift flowing Nelson River at Grand Rapids. The power plant is located about 50 miles northeast of the mining operations and approximately 10 miles northwest of the Hudson Bay Railway. At the outset the plant will generate 132,000 kilowatts of electricity of which Inco will require 102,000. The remainder will be available for other industry, the most likely being pulp and paper mills.

WESTERN ONTARIO METALS REGION

The Western Ontario Metals Region, producing about eight per cent of the metals of the Shield, is an area of widely dispersed mining districts (Figure 7). This area reflects both decline and growth in mining. The gold mining districts which totalled at least 13 in 1940 have now declined to five (Figure 3).

Of the gold districts, the Patrician with an output of 422,289 fine ounces in 1956 produced about 75 per cent of the gold of the region. Production is centered at Red and Pickle Lakes. The Thunder Bay District is second with an output of 99,003 fine ounces of gold in 1956. Other smaller centers include the Missanabie District of Ontario and the Rice Lake District on the border of Ontario and Manitoba.

The future of this mining region depends, not on gold, but on the development of the iron ore deposits of Steep Rock and Michipicoten and the newly developed copper district of Manitouwadge. The iron ore deposits have long been known in western Ontario, but were sporadically worked until the early 1940's. The largest deposit, discovered in 1890, is found at Steep Rock. However, the major ore body was at the bottom of Steep Rock and defied exploitation for decades. Finally in 1939 it was decided to drain the lake, a body of water of seven square miles and of considerable depth. The initial step required the diversion of the Seine River. When this was completed the monumental task of pumping out 100 billion gallons of water began in 1943. By May 1944 the lake bottom was exposed, and the removal of million upon millions of cubic yards of silt began. The first ore shipments were begun in 1945 and in 1956, 3,317,073 tons of hematite ore were shipped. There is an anticipated sustained yield of 5.500,000 tons annually commencing in 1959 from open pit and underground mining. The ore reserve in the area has been estimated at 300,000,000 tons per 1000 feet of depth.

In the Michipicoten area iron ore was mined intermittently from 1899 to 1921. Production ceased because of the low iron content of the siderite ore. With the construction of sintering and beneficiation

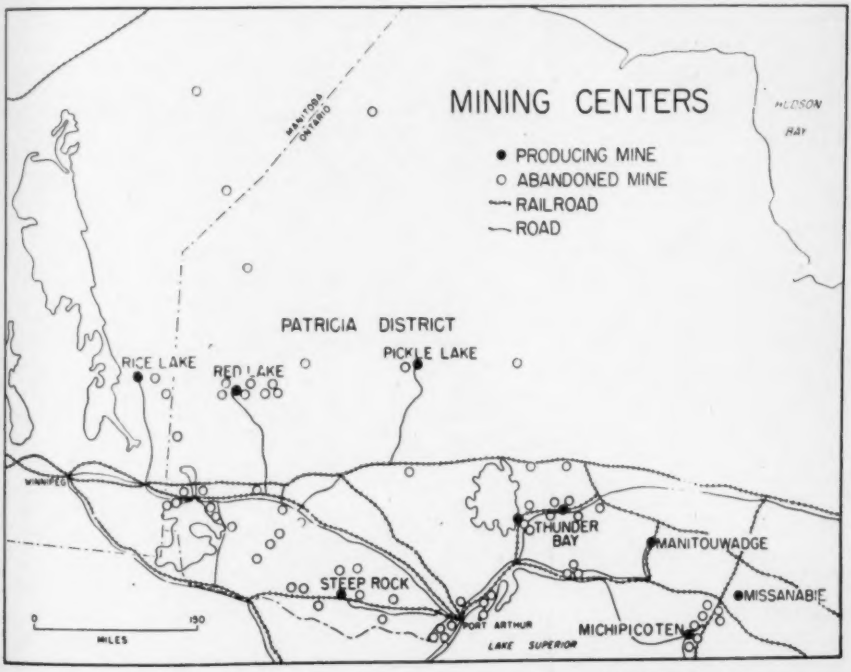

FIGURE 7. The mining districts of the Western Ontario Metals Region.

plants production was resumed in 1939. About two thirds of the siderite is processed by direct sintering and one third requires beneficiation at the sink-float plant at Jamestown before sintering. The siderite, averaging 35 per cent iron, is sintered to a product averaging 50.9 per cent iron, 2.8 per cent manganese, and 11.08 per cent silica. Annual production in 1956 was over 1,400,000 tons. The development of the iron ore resources of the Michipicoten District illustrates the growing utilization of low-grade ores on the Shield.

In 1953 a rich copper deposit was discovered in the Manitouwadge Lake District. With the completion of the initial mine and associated mill, production of copper began in 1957. This was the first base metal discovery in the region and may indicate the possibility of other new discoveries. The deposit was of sufficient size to justify the creation of a new town complete with parks, schools, a golf course and other facilities. The Ontario Department of Planning and Development is supervising the progress of the town to accommodate as many as 6,000 people.

Because the initial gold mines were located in isolated regions, most of the mining districts were initially served only by air transportation. This early method of travel was successful because the large number of rivers and lakes on the Canadian Shield made it possible for hydro planes to land close to isolated mines or in areas where geology was favorable to mineral occurrences. However, this mode of transportation is costly. In order to develop the mining economy the Ontario Department of Mines started a program in 1951 for the construction of mining access roads. As a result all mining districts are now served by railroads and/or roads. These transportational developments have provided not only material assistance in the operation of the mines, but a great convenience to the mining population.

In western Ontario there is a population supported by mining of approximately 20,000 persons. During the gold mining period from about 1930 to the early 1940's the population was widely scattred in dozens of gold mining camps. With the growth of major mining centers, the population has concentrated in a few areas with small cities emerging. The most rapidly growing center is the city of Atikokan, serving the Steep Rock iron mining development. Population of this city has increased from 2,821 in 1951 to 6,113 in 1956. The largest gold mining center is Red Lake with a population of 3,294 in 1956. In the Thunder Bay District, Geraldton, serving as the major commercial center for the gold mining communities, had a population of 3,263 in 1956. There are many ghost towns in the region that thrived for a few years in the 1930's.

ISOLATING MINING DISTRICTS

On the Canadian Shield a number of important mineral districts are located in isolated areas (Figure 1). Because all of these districts were originally inaccessible, they had to possess unique mineral characteristics to justify the costs of development. Two types of isolated districts can now be recognized. The first type is characterized as one with a massive deposit of ore that has an assured world market justifying tremendous developmental costs particularly in transportation. The second type of isolated mining district is one in which the mineral exploited is rare and of particularly high value.

The iron ores of the Schefferville district at Knob Lake illustrate the massive ore deposit (Figure 3). This district lies in the heart of the Labrador-Ungava Peninsula. After years of exploration a reserve of 400,000,000 tons of direct-shipping ore was proved by the late 1940's. In 1950 initial operations to exploit the ore began with the increased demands for ore in the United States of America created by the Korean War and the foreseeable depletion of the iron ore deposits of the Upper Great Lakes iron ore ranges. The initial project included the building of a 360 mile railway from Sept Isles on the Gulf of St. Lawrence to the ore deposit, the construction of ore docks at Sept Isles and the town of Schefferville, and the building of a power plant at Knob Lake.

The railroad was completed in 1954 and the first ore was mined during that year. Production has steadily increased until in 1956 output totaled 12,156,034 tons averaging 51.6 per cent iron from four mines of which two were in Quebec and two in Newfoundland. Schefferville, a one-company town, has continued to grow since its initial construction in 1953,[19] and it now includes all modern facilities.

The isolated mining districts possessing minerals of high value include the gold district of Yellowknife in the Northwest Territory, the uranium districts of Port Radium Northwest Territory; Beaverlodge, Saskatchewan, and Bancroft in Ontario, and the ilmenite - hematite deposits of Allard Lake, Quebec.

The Yellowknife District located on Great Slave Lake, is situated in some of the richest gold producing country of Canada (Figure 3). It is also almost totally isolated. Between Yellowknife and Edmonton lie 700 miles of nearly virgin country. The mining community of Yellowknife came into existence in 1935 as a boom town.[20] With new gold discoveries in 1944 the migration to the area increased. For many years the town was served almost entirely by air plane. In the late 1940's a road was built from the Peace River Country to the southern edge of Great Slave Lake at Hay River. Goods were then portaged across the lake during the four summer months. In winter, a little freight was hauled by "cat train" (tractors) across the frozen lake. Finally in the middle 1950's a gravel road was completed to Yellowknife.

Today Yellowknife is typical of the older mining town making the transition to a modern community. The two mining companies account for about one half of Yellowknife's population of 2800. The remainder are employed in services. Many of the town's population are spare time prospectors, staking the maximum of six claims a year. The town provides economic and recreational facilities similar to those of southern Canada.

The world demand for radium and uranium has been a major incentive for the development of isolated mining areas. Pitchblende was first discovered in 1929 on Great Bear Lake and production began at the Port Hope, Ontario plant in 1933.[21] This area was virtually isolated, and necessary supplies for the mining activities were brought almost entirely by air. During the 1930's this deposit was the principal source of radium in the world.

With the demand for uranium since the early 1940's a number of uranium mining districts have developed. In Saskatchewan a major uranium deposit is found in the Beaverlodge Lake area, about 400 miles by air from Prince Albert. A decade ago this was a lonely trappers' outpost and the site of an abandoned gold mine. Production of uranium began in the area in 1953, and has increased steadily. By 1955 the annual value of radioactive minerals was $14.000.000. With a greatly expanded milling capacity in prospect, this value may be doubled or tripled by 1960. The area is served by a water route, and air freight facilities are also available. The mining and refining of uranium ore alone have created employment for about 2,000 men, and a modern community, Uranium City, has developed in the wilderness area.[22]

On the southern portion of the Shield in Ontario, the Bancroft District is developing as a major uranium producing center. Production began in 1956. Although the ore of this region is relatively low grade, averaging about 0.1 per cent U_3O_8, relative accessibility and the high reserve make mining economically feasible.

The ilmenite-hematite ores of Allard Lake in Quebec were discovered in 1946. This is probably the largest deposit of ilmenite in the world with about 150,000,000 tons of ore averaging about 35 per cent TiO_2 and 40 per cent iron. Exploitation was delayed until 1950 when a 27 mile railway connected Lac Tio with the port of Havre St. Pierre. The railway extends through 15 miles of rock country and 12 miles of muskeg. Crushing plants and other facilities are now installed, and the ore is shipped to Sorel, Quebec for smelting (Figure 5).

CONCLUSIONS

From this study of mineral regionalism a number of conclusions can be drawn. Although an advanced mineral economy exists in certain parts of the Canadian Shield, exploitation of minerals is still largely limited to its periphery. Vast areas of sedimentary and volcanic rocks are still undeveloped and provide excellent possibilities for the future. Second, mineral regions are dynamics, but there is no assurance that an area will progressively develop from an isolated district, to a dispersed mineral region, and finally to a unified mineral region. Third, geology controls the basic deposition of an ore deposit, but interrelated economic factors control the development of a district at any given time. Fourth, there is little or no indication that mineral exploitation will initiate a permanent economy in the mineral regions of the Canadian Shield. In all instances to the present, the economy of a depleted mineral district has essentially disappeared with cessation of mining. Finally, the development of minerals in the Shield illustrates how the resources of a portion of the nation can energize the entire economy.

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11. The ratio of male population to total population: Sudbury, 52.2 per cent; Timmins, 51.3 per cent; Noranda, 51.3 per cent; Rouyn, 51.7 per cent; Hamilton, 49.0 per cent; Toronto, 49.0 per cent; Montreal, 48.8 per cent; and Ottawa, 47.3 per cent.
12. Percentage of population 0 to 19 years age group: Sudbury, 38.4 per cent; Timmins, 42.3 per cent; Rouyn, 49.5 per cent; Noranda, 47.0 per cent; Toronto, 25.8 per cent; Ottawa, 34.6 per cent; Montreal, 33.6 per cent; Hamilton, 32.9 per cent.
13. Percentage of population over 45 years of age: Sudbury, 19.7 per cent; Timmins, 22.3 per cent; Rouyn, 14.0 per cent; Noranda, 15.8 per cent; Toronto, 33.7 per cent; Ottawa, 22.3 per cent; Montreal, 26.2 per cent; Hamilton, 28.4 per cent.
14. Percentage of married population: Sudbury, 46.6 per cent; Timmins, 45.0 per cent; Rouyn, 38.6 per cent; Noranda, 42.3 per cent; Toronto, 49.1 per cent; Ottawa, 45.0 per cent; Montreal, 45.6 per cent; London, 48.0 per cent.
15. Percentage of single people 15 years and over: Sudbury, 19.2 per cent; Timmins, 16.1 per cent; Rouyn, 18.0 per cent; Noranda, 17.1 per cent; Toronto, 22.6 per cent; Ottawa, 20.7 per cent; London, 19.7 per cent; Montreal, 22.6 per cent.
16. Percentage of families with no children: Sudbury 29.3 per cent; Timmins, 26.5 per cent; Rouyn, 20.0 per cent; Noranda, 18.8 per cent; Toronto, 44.4 per cent; Ottawa, 33.7 per cent; Montreal, 34.4 per cent; London, 39.3 per cent.
17. Percentage of male workers with salaries above $2000. (Census of Canada 1951). Noranda, 54.5 per cent; Sudbury, 57.5 per cent; Timmins, 39.2 per cent; Toronto, 39.3 per cent; Ottawa, 43.2 per cent; London, 41.2 per cent; Montreal, 31.8 per cent.
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POPULATION CHANGES ON THE SALONIKA CAMPAGNA *

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ABSTRACT. *Since the Greek annexation of this plain in 1913 there have been some significant changes in the total number, distribution and composition of its population. These changes result from a number of causes but primarily because of war, internal and external population movements. The economy of the area has also moved in sympathy with population growths and hence the use of older traditional farming methods has declined. Reclamations and other extensions to the arable land have been conducive to both greater and more diversified crop returns. In the urban centres the former reliance of manufacturing industries upon local agricultural products persists whilst in both industry and commerce the small sized concern still predominates. Salonika, as always, continues to dominate the whole Macedonian scene but appears to draw into itself a disporportionately large share of industry, commerce and "floating" rural population.*

RÉSUMÉ. *L'annexation de cette région par la Grèce en 1913, amena des changements très importants dans la distribution, la composition et dans la densité de la population. Ces changements démographiques sont dus à plusieurs causes, pour ne mentionner que la guerre et certains mouvements internes et externes de la population. L'économie de cette région s'est maintenue en population provoquant ainsi le déclin des méthodes traditionnelles de culture. De plus, certains travaux de réclamation et d'extension des terres arables, contribuèrent largement à obtenir des récoltes toujours plus abondantes et plus diversifiées. La dépendance de l'industrie manufacturière à l'agriculture locale persiste toujours dans les centres urbains, tandis que dans les domaines de l'industrie et du commerce, la prédominance de la petite entreprise se réaffirme de plus en plus. Salonika domine toujours la scène macédonienne et semble s'accaparer une part toujours plus grande de l'industrie, du commerce et de la population rurale flottante.*

Natural factors dictated that the first settlement in this area should be peripheral to the present day lowland plains because of the former extent of water on them.[1] It was on the piedmont slopes, marginal terraces and the dissected upland plains about a shallow extension of the Salonika Gulf that safe and well watered sites existed, suitable for clearing, agricultural pursuits and lines of communication.[1] Similarly, and in later times, the risk of flooding was minimised there and the dangers of disease also reduced. Especially favoured sites for the acquisition of additional commercial and strategic functions were those at points where through routes emerged from the mountains, or where important overland routes met, and these were soon developed by the inhabitants to give the thriving predecessors of Edessa, Naoussa, Verria and Salonika.[2] Always in the background however rose the steep and thickly forested slopes of the Vermion, Paikon and Khortiatis horsts — restricting ramparts which offered only limited prospects for land utilization and permanent settlement. Salonika, in its turn, was early destined to possess the only enduring site and situation qualities for a port, because of the nature and changing details of the nearby deltaic coast as well as the unfavourable behaviour of the Aliakmon, Axios and Gallicos rivers. In brief, therefore, the basic features of the population and settlement distribution were established in classical times, and no modern visitor to the area can fail to be impressed by the continuous occupation of many settlement sites for periods of 2,500 years or more. With the passage of time natural processes have continued to influence the population of the area, especially in enticing permanent and temporary settlements down to the emergent lowland plain as the combined river delta has grown.[3] However, whilst the Salonika plain proper doubled its area naturally during the last 2,500 years this desirable acquisition has had to be paid for in terms of soil depletion on the adjacent upland and mountain areas.

To complete this short introduction it is also necessary to touch upon historical events in the area, for after the golden days of Phillip and Alexander the number and ethnic composition of its inhabitants changed radically. Subsequent incursions and settlement by Serb and Bulgar Slavs, Jews, Vlachs and Turks both increased and mixed its numbers whilst Turkish

* The writer is grateful for the financial assistance he received for field work from the Carnegie & Leverhulme Trusts. Thanks are also due to Professors Miller and Gomme for their support in this work.

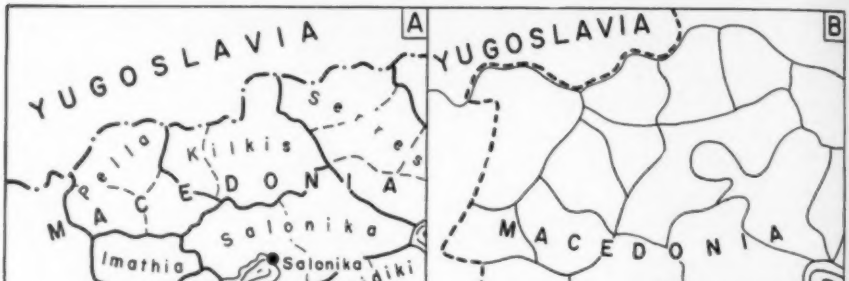

FIGURE 1. Administrative subdivisions in Central Macedonia (A. Present subdivisions, showing district boundaries in broken lines. B. Boundaries preceding Greek annexation, showing kazas or district boundaries in solid lines).

domination for 460 years influenced its culture. The several nationalities represented in this area (as for the whole of Macedonia) helped to precipitate a series of political crises during the latter 19th and present centuries, and it is these events which have had such far reaching consequences upon the present landscape and its people.[4] (Figure 1)

In the early troubled years following the Greek annexation of 1913 the population was smaller, but nevertheless about 200,000 of the inhabitants were living in Salonika, Verria, Naoussa, Edessa, Yannitsa and Kilkis. Salonika alone accounted for 75% of the urban dwellers and at this time almost 2/3 of its populace were Jews. Segregation of its population into Turkish, Jewish and Greek sections was another noteworthy feature which was common to many of the contemporary settlements in Macedonia. Narrow winding streets lined with houses of indifferent standards were also typical, and general amenities were usually poor. Inevitably the poor sanitary conditions and medical facilities, in both urban and rural districts, did little to discourage outbreaks of typhoid and typhus or check the spread of epidemics such as smallpox or diphtheria. Malaria was endemic, and, in fact, it has only been checked effectively within comparatively recent years. In the countryside the small, agglomerated settlement was (and still is) predominant. The typical village might possess some 150 houses, each built of local materials, but sparingly furnished and grossly overcrowded. About the village the land provided the means of sustenance and the chief source of income, but invariably it was worked on a "métayer" system, in which the individual lots formed part of a Musselman's estate. Naturally once the Turks began to withdraw, the metayers, the existing landless, the population overspill from "Old Greece" and later the incoming refugees from abroad all demanded a share of the land available. Necessarily, therefore, land reforms and surveys had to be undertaken, expropriations enforced, so that fresh allocations could be made to the populace.[5]

On the ground itself the established farming practices were mostly unprogressive and inefficient, with wheat, maize and barley the most commonly grown cereals, and, together with small amounts

of cotton and tobacco, these crops occupied the best available land. For the time being, however, large areas of potentially useful land were denied to the farmers because of marsh, standing or fluctuating amounts of water on the flood and delta plains. Paradoxically, the dearth of available surface and ground water on other stretches of land also deterred permanent agricultural settlement. Vines were fairly widespread, but phylloxera-prone, and like the fruit and mulberry trees did best along the western hillfoot zone. Although numerous, the livestock formed a motley collection, because of indifferent husbandry and their place in the general farm economy. However a few noteworthy cattlebreeding areas and sheep pastures existed out on the plain proper. These livestock areas were subsequently to shrink because of land reform, the spread of land-hungry refugee settlers, changed land values in step with national population growths and the initiation of reclamation projects in the area.

In this predominantly agrarian landscape it was the processing of local agricultural products which supplied important industries to the towns and city, e.g., wine making, milling and tanning at Salonika, Verria, Naoussa and Edessa, and this tie between town and farmland still persists. In addition the urban settlements also possessed collecting, distribution and administrative functions each with its own sphere of influence but all of them subordinate to the dominant role of Salonika.

Political events soon intervened to hasten the scope and speed of changes in the area for, during World War I, Turkish emigration quickened and at the same time a trickle of immigrants from Asia Minor and the Black Sea coast appeared. This inward flow became a human flood in the 1920-1930 period, once official exchanges of population had been arranged with Turkey and Bulgaria by the government, i.e. in the Lausanne and Neuilly agreements.[6] The League of Nations established a Refugee Settlement Commission to work in the stricken areas, and they, together with the State and charitable organisations, did their best to provide the incoming Greek refugees with bare essentials during the resettlement period. The effects of these population movements were manifold since the largest minorities were replaced by Greeks formerly living or born in adjacent territories. Again, in spite of the early high mortality rates, the refugees inflated the total population numbers and also stimulated both industrial and agricultural developments (see Table I).

Some indication of the change in migration rates is to be had from official sources which show that 99,658 refugees arrived in Macedonia prior to the Smyrna disaster (1922) but in the following six years 538,595 arrived. Of these immigrants it is considered that 40% of the second group settled in the area, alongside 50% of the first arrivals. It also seems probable that no less than 40,000 refugees were established in the Verria-Edessa district by mid 1929, with another 26,000 about Yannitsa. Similarly at least 50,000 incomers settled in Kilkis department and not less than 40,000 stayed permanently about Salonika. Acute shortage of dwelling space occurred over the resettlement years. In a five year period about 7,000 new, standardised dwellings were built

TABLE I - POPULATION CHANGES SINCE 1913

Population	1913	1920	1928	1940	1951
Macedonia	1,167,617	1,078,748	1,412,477	1,759,130	1,700,835
Central Meced.	450,000	446,500	637,696	784,100	849,000
Area considered	?	?	?	595,300	638,000
Salonika	157,889	174,390	251,254	278,145	297,164
Verria	13,812	13,349	14,589	16,413	21,844
Yannitsa	?	7,850	9,128	12,964	16,640
Edessa	8,846	9,441	13,115	12,377	14,940
Naoussa	9,681	8,468	10,250	12,556	12,584
City Totals	190,228	213,498	298,336	332,455	361,172

by the Refugee Settlement Commission for immediate occupation, the State and the refugees themselves built another 4,000 dwellings, and yet another 12,000 former Turkish dwellings were also pressed into service. Apart from the quarters vacated by 60,000 or so Turks in the area, additional space also became available when 16-20,000 Bulgar Slavs were repatriated. On balance, therefore, it seems possible that because of population migrations the area gained at least 110,000 persons before 1930, as well as about 36 new settlements. (Figure 2)

Over the same period an agrarian revolution also took place, since changes in the population were accompanied by reduction in the established periods of fallow, modified cropping systems and extensions to the area under plough. Increased ground water supplies were made available for human, animal and vegetable use, and agricultural cooperatives also first appeared in the farming districts. To meet demands considerable quantities of vines, Bulgarian roses and mulberries were imported for distribution, hemp was temporarily grown near Yannitsa, whilst drought resistant Canberra wheat, lucerne and vetches were also introduced. Although the cotton boom did not begin until after 1931 the new farmers quickly planted new tobacco varieties in the area as well as stimulating market gardening developments. Of the other innovations in the rural scene during this time the stud farm, plant nursery, motor tractor, steel plough, schools and

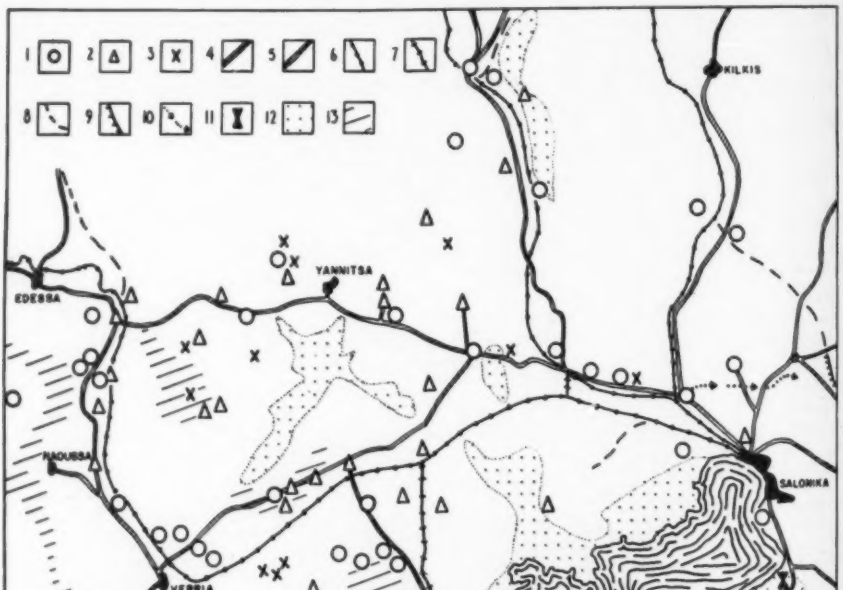

FIGURE 2. Some changes in the landscape features near Salonika since 1915. (1. New villages, established after 1920; 2. Villages where considerable growths have occurred since 1920; 3. Villages abandoned since 1920, either because of amalgamations or hydrological works; 4. Main roads, with paved surfaces by 1955; 5. Main roads, unpaved in 1955; 6. Railways completed under Turkish rule; 7. Railways completed shortly after 1918; 8. Light raildway present in World War I but now abandoned; 9. Existing light railway; 10. Projected railway line, in 1955 only partially prepared; 11. Civil aerodrome with regular domestic and foreign traffic; 12. Reclaimed marsh and lake areas; 13. Woodland and scrub areas which are now virtually cleared).

medical dispensaries all deserve mention since they were also symptomatic of the break with the past. Nor were the urban settlers ignored in terms of dwelling space, amenities or grants in the rehabilitation work and many were helped to reestablish their former professions e.g. the weavers in Salonika and Yannitsa. Shares in the land were also given to town and city dwellers, and many of these holdings still belong to the non-village dwellers. However, because of the predominance of farmers amongst the refugees it is not surprising to find that the labour structure of the working population changed between 1920 and 1928 with agricultural, hunting and fishing occupations rising from a range of 44-78% across the area to ranges of 51-85%.

At the same time the government decided to drain, reclaim and protect large tracts of wet lowland in the area, and in 1925 a start was made on the Foundation Company's project.[7] In retrospect it appears that whilst limited amounts of drainage and irrigation had been undertaken by the inhabitants in Classical and Byzantine times, little had been done since then except, about the turn of the present century, along the Vermion hillfoot zone. The task of draining and reclaiming Lakes Yannitsa, Ardzan and Amatovo, as well as training the major rivers took ten years to complete, but fortunately benefits accrued as the work progressed. Formerly many farmers gambled at planting time, between river flooding and late seeding under less certain rainfall conditions, until these and succeeding hydraulic works were undertaken. Another important issue involved in this project was the future of the port facilities at Salonika, for by World War I the main Axios outlet was only four miles away from it. Had the lower course of the Axios not been diverted artificially and trained, the usefulness of the port to large vessels would now be declining, provided the 1916-1924 rates of seaward extension had been maintained. (Figure 3)

The hydraulic works also included straightening out the lower Aliakmon course, the construction of a circulatory canal to gather up water from the foot of the Vermion range, and the extensive use of drainage canals, all of which had to be accompanied by protective embankments and new bridges. When completed the Foundation project had drained 108,000 acres of potentially productive land, protected another 198,000 acres, considerably reduced the risk of malaria and safeguarded the port interests in Salonika — besides employing an average of 2,800 local inhabitants. Furthermore the finished works provided a sound basis for later reclamation, protective and irri-

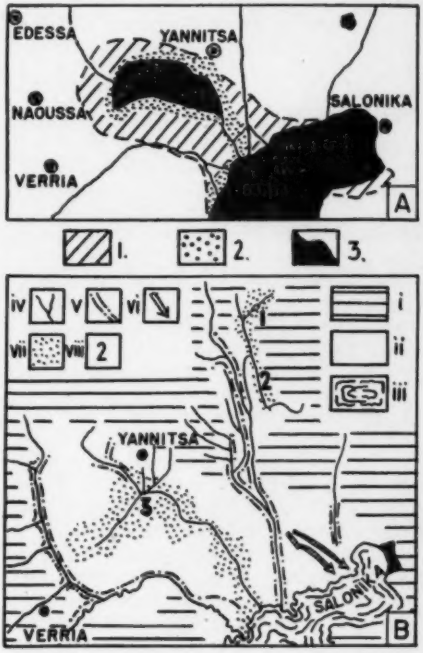

FIGURE 3. Hydrographic changes in the Salonika area. (After Struck and Huntsman).

A. Changes to the deltaic coast (1. Approx. extent of shallow waters by the end of 5th century B.C.; 2. Approx. extent of bay waters by the end of 1st century B.C.; 3. The bay and Yannista lake by 500 A.D.)

B. Features of the Foundation Company's Reclamation Project (i upland; ii plain; iii open water; iv major water courses; v protective embankments; vi former course of the lower Akios; vii former marsh and standing water areas; viii 1, 2 and 3 indicate the approx. position of Lakes Ardzan, Amatoro and Yannitsa respectively).

gation works in the area, besides offering the immediate space needed for settlement, cropland extensions and better road communications. Paradoxically whilst so much attention was devoted to surface and ground water conditions on the plain, the use of potential water power in the marginal zones was extremely tardy, considering the lack of fuel resources in the area. Before World War I, Salonika alone possessed its own electricity supply, and even by 1930 only a few, small water-driven power plants operated at Verria, Naoussa and Edessa. (Not until after World War II has a modern hydro-electrical power plant been completed at Agra, and another started at Edessa as links in the projected modern electric grid system).

Hard on the heels of the refugees came the depression years and attendant difficult times, since so much of the area's economy was dependent upon agriculture. Even in spite of government protection to the farmers, financial loans became a necessity for many of the people to help them weather the crisis. Nevertheless, in spite of setbacks, the volume of agricultural production from the area has increased until now 25% of the total area of Central Macedonia is cropped annually. Of the 692,000 acres involved, 74% is devoted to food grains, 16% to cotton and tobacco, 4% legumes and the remainder is given to producing fresh vegetables, melons and potatoes. Aside from the larger economic issues which affected agriculture in the area two particular factors were contributory to the increased production. The first of these involved the initiative and help of government farm services which, after 1931, stimulated and developed cotton production, and later, in 1947, pioneered rice cultivation on delta lands. The second factor was the decision to undertake a further phase of reclamation and conservation work in the area, and this still continues. With the completion of the original reclamations in 1935, the State, in 1937, undertook to manage and extend the hydraulic works in the area. As a result at least another 100,000 acres have been drained, 50,000 acres more protected against flooding and an additional 20,000 acres irrigated. The scope of the present agency (Y.P.E.M.) is extremely wide, and its most important project at present is the Aliakmon barrage south of Verria. The aim of this project is to extend the present area of irrigation on the north bank of the river downstream,[8] but in the author's opinion the risk of silt accumulation at the dam must be a very high one. Y.P.E.M. also successfully sponsored rice cultivation on the outer margins of the Axios delta and at present modern equipment is used there on 5,000 acres of formerly saline pasturage. (Figure 4)

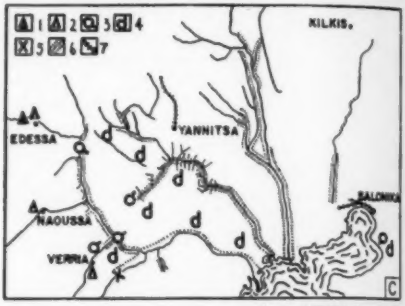

FIGURE 4. Features of current hydrographical installations (1. Modern H.E.P. plant at Agra; 2. Small H.E.P. plants serving local needs; 3. Points where water is drawn for extensive irrigation works; 4. Drainage works; 5. Site for the new Aliakmon Dam; 6. Protective embankments; 7. Piped water supply).

Meanwhile, industry and commerce also have made significant but slower, contributions to the economy of the area and brought changes in the urban centres (see Tables I and II). Generally the small sized concern has continued to predominate in industry and commerce, so that even now 5,735 persons are employed in manufacturing and handicraft establishments of Central Macedonia each with less than 5 workers.[9] Again, only in Salonika and the larger settlements have the advantages of electrical power begun to be realised, even though the usefulness of this power to the cottage industry in the area is obvious. Salonika has continued to draw into itself a disproportionately large share of the industry and

TABLE II

Some Aspects of Non-agricultural Employment in Central Macedonia, 1951

Department	A	B	C	D
Imathia	651	3,937	1,896	242
Salonika	5,507	25,464	23,080	1,571
Kilkis	523	951	1,350	173
Pella	904	3,076	2,475	242
Pieria	604	1,187	1,401	150
TOTALS	8,189	34,615	30,202	2,378

A. Number of manufacturing and handicraft establishments.
B. Number of persons employed in manufacturing and Handicraft Establishments.
C. Number of persons engaged in commercial establishments.
D. Number of cottage industry establishments.

commerce in the area, and now possesses 4,200 industrial establishments employing 22,770 persons. In addition to important textile, food processing, transportation and metal industries it is the provincial centre for the wholesale and retail trades, and hence it also continues to be the chief urban magnet for "floating" rural population. "Astiphilia", syphoning of numbers of the rural population into the towns and city was probably well established in the area before World War II, and like the longer range migrations to the New World still continues.

All too soon the busy period of development and consolidation, which followed resettlement and assimilation, was abruptly terminated, first by the fighting and occupation of World War II, and then by the civil war troubles. During the 1941-45 period the area formed part of an arbitrarily defined province under German occupation, and within it Salonika also formed a transit point for deportees on their way out of Greece. Severe oppression by the Bulgars and Albanians in Thrace and Epirus encouraged outward population movements from these areas; reprisals for resistance activities and chronic food shortages also stimulated internal migration into the large and medium sized settlements. Partial and complete destruction of whole settlements, due to fighting and reprisals, was especially severe in Macedonia e.g. between the railway station and the free port zone in Salonika, or in the almost gutted town of Yannitsa, so that once again a dwelling and building shortage accompanied high mortality rates and near starvation conditions in parts of the area. Additional damage to property and loss of life was still to come during the succeeding civil war e.g., in Naoussa and Edessa. As in the preceeding years many of the inhabitants were again displaced, moving into the safety of the garrison towns where shelter and food were obtainable. There can be little doubt that many of the war-weary folks near the northern frontiers of

TABLE III

Manufacturing and Handicraft Establishments in Central Macedonia, by time of original establishment.

Department	At 1920	1921-30	1931-40	1941-45	1946-48	1949-51
Imathia	72	115	112	64	94	174
Salonika	277	958	1,382	767	805	1,144
Kilkis	29	122	94	60	57	138
Pella	62	151	185	81	115	275
Pieria	50	77	132	73	90	157
TOTALS	490	1,243	1,905	1,045	1,161	1,888

Greece moved permanently into this area between 1941 and 1949. Furthermore, the insurgent abduction of 25,000 children from northern Greece as well as the execution of 60,000 citizens in Macedonia during the occupation years all suggest that another major turnover in population of this area has occurred. Thus even though its population has increased since 1940, it is probably still approximately 8,000 short of what it should have been by 1951, in spite of inward migrations and natural increase. (Figure 5)

By 1951 the area, which amounts to 18% of Macedonia, carried about 638,000 people, or 37½% of the total population of Macedonia. At this time over 353,000 persons lived in eight cities, about 61,000 were in twenty towns and most of the remainder were to be found in the four hundred villages scattered over the area. The majority of the settlements are nucleated and lie below 100 meters on the plain, which forms 45% of the area. Yet in spite of modern developments, the population is still concentrated into three districts as of old, i.e. about Salonika, between Verria and Naoussa, and in a strip between Edessa and Yannitsa. Here, upon one seventh of this 6,300 sq. kms. live two thirds of the population, and here the degree of urbanisation is highest and the intensity of the land use greatest.[10] At the last census too, there was the highest Greek proportion ever in the population for even the most persistent of the ethnic minorities have now been shed or assimilated. Most of the 20,000-25,000 Slavs who used to form a sizeable fraction of the population in the north-west of the area, e.g., in Edessa, have either left the country in the last ten years or else profess Hellenic ideals. The Jewish community, until recently so conspicious in centres like Salonika and Verria, was cut back to insignificance during occupation days. Again, the Kautso-Vlachs, who were distinctive about Verria and

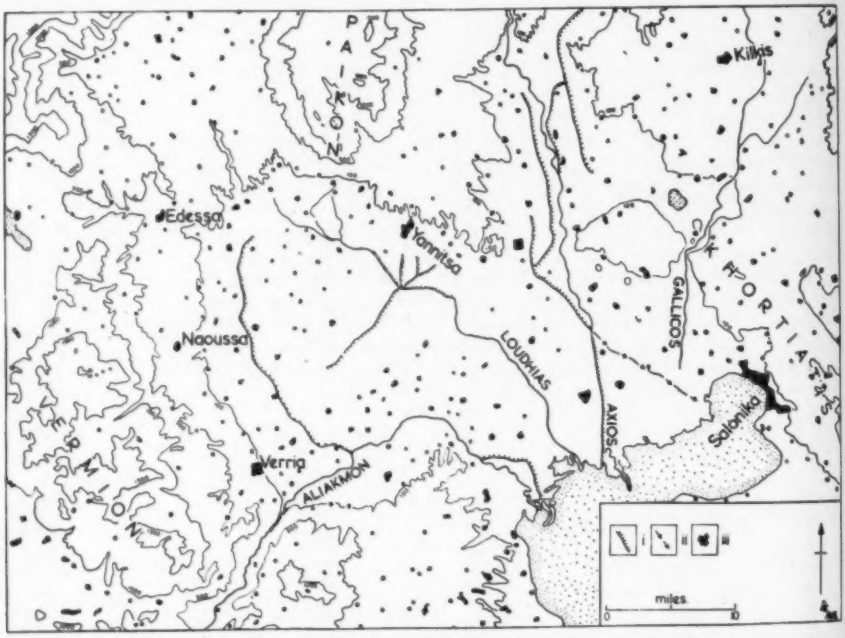

FIGURE 5. Distribution of settlements in Central Macedonia, 1951. (i. canalized water courses; ii. old Axios line; iii. agglomerated settlements).

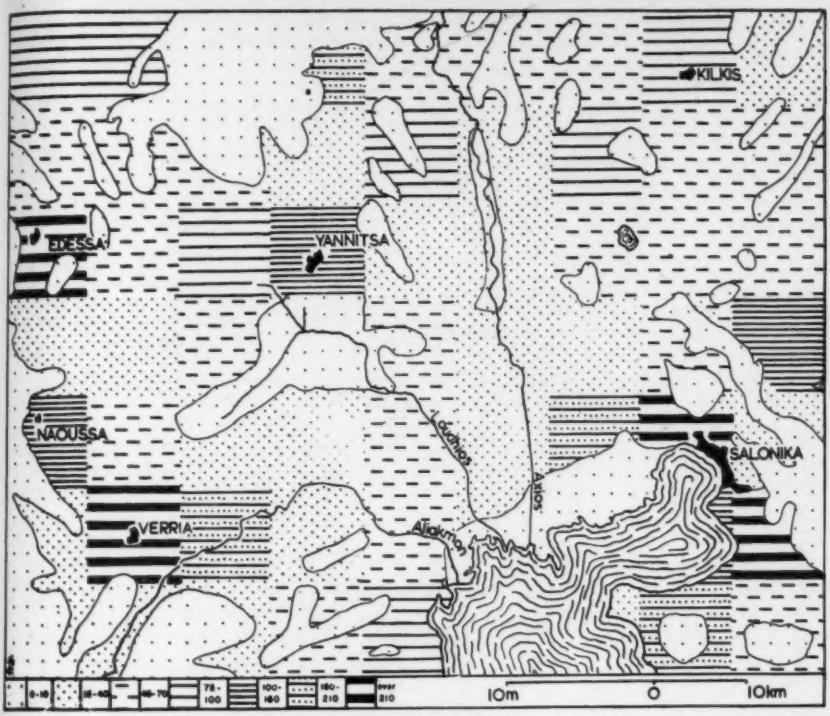

FIGURE 6. Estimated population density in Central Macedonia, 1951, in persons per square kilometre (In this figure the truly negative areas were easy to define but elsewhere a number of difficulties arose. Incomplete detailed population statistics, together with a lack of precise information on land holding sizes necessarily meant generalisation was inevitable. However, Imathia was early selected as a pilot area for checking estimated population totals and distribution before the complete map was finished. Thus so far as possible the finished diagram is an attempt to demonstrate inter-relationships between population and the land about the settlements).

formerly the butt for Rumanian aspirations, have now also been absorbed. The few Albanian or Turkish speaking residents now remaining are either pro-Hellenes or of Greek stock originally, whilst most of the Armenians in Macedonia returned to the U.S.S.R. in 1946. (Figure 6)

Two long periods of strife, between 1912-20 and 1941-49 accompanied by

TABLE IV

The population of Central Departments of Macedonia according to the Census of 1928, 1940 and 1951.

Department	1928[1]	1940[1]	1951
Kilkis	74,065	101,820	89,475
Imathia	63,314	86,998	96,439
Salonika	368,331	425,855	459,956
Pieria	50,703	77,032	86,161
Pella	88,106	120,850	116,969

[1] According to the administrative boundaries of each department in 1951.

major external and internal migrations have thus intimately affected this area. Economic developments in the aftermath years have been characterized by intensification of effort on the part of the Macedonians. In fact these people repeatedly have shown amazing resilience and fortitude in coming to terms with their environment, as well as living in peace so close to unsympathetic neighbours.

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MAP OF THE DISTRIBUTION OF ESKIMOS AND NATIVE GREENLANDERS IN NORTH AMERICA

TREVOR LLOYD
Dartmouth College

RÉSUMÉ. *Cette carte de caractère pédagogique montrela répartition des esquimaux et natifs groenlandais de l'Amérique du nord. Les autorités concernées ont gracieusement fourni les données nécessaires à la compilation de cette carte, bien que celle-ci aille au-delà des statistiques déjà publiées. Parmi certaines difficultés, on note celles engendrées par la localisation de ces emplacements rapportés lors du dernier recensement, mais dont on a pas retrouve trace depuis.*

L'emploi de symboles circulaires s'est avéré inéfficace dans ce cas-ci, la vérité des dimensions des localités obscurcissant outre mesure la représentation graphique de la population. Un système multicirculaire fut dont adopté même si celui-ci tend à fausser quelque peu le nombre des villages. Un tableau dans le texte montre les données de la population selon le recensement, de même que la position géographique de chacun des endroits. Des remerciements sont adressés à l'endroit des officiers du recensement des trois gouvernements concernés, ainsi qu'à tous ceux qui ont rendu possible la préparation de cette carte.

Owing to the lack of a satisfactory map showing the distribution of Eskimos in Canada and the United States of America (Alaska) and native Greenlanders in Greenland, the writer assumed the task of compiling one from the latest available statistics. The most recent Census was, in the case of Alaska, that for 1950; for Canada that for the 1951 summer; and for Greenland, that for December 31, 1951.

Published statistics proved not to be sufficiently detailed so it was necessary to secure copies of the original records held in Washington, Ottawa and Copenhagen. The difficulty and considerable expense of having a special analysis made in the case of the Alaskan Eskimos was avoided through the generous aid of Professor Kirk L. Stone of the University of Wisconsin, Department of Geography, who was using statistics of Alaska's population for another purpose. The Canadian data were obtained through the cooperation of Dr. C. C. Lingard of the Dominion Bureau of Statistics in Ottawa. In the case of Greenland, it was found that Professor Niels Nielsen of the Geographical Institute, University of Copenhagen was already at work on a population map for use by the Greenland administration. Through the courtesy of Professor Nielsen and the head of the Administration, then Director (now Departementschef) Eske Brun, a copy of the original statistical breakdown was provided.

There proved to be considerable difficulty in devising cartographic symbols to show the population distribution legibly. One problem was the size of settlements, which ranged from quite large ones, such as Godthaab in Greenland, down to outposts of a dozen or less. Another was that in Canada and parts of Alaska the Eskimos are nomadic and so cannot, strictly speaking, be shown as residing at any specific place. The nomadism problem was dealt with by locating the Eskimos at the registration centers used for the Census. In such cases the Eskimos may be expected to live within less than 100 miles of the place where the dots are shown. As concerns settlement size, it was decided that no system of single dots could possibly represent all the gradations needed, so a multiple system was employed. This had the disadvantage that each dot on the map did not necessarily represent a single settlement. The dot pattern used in the original manuscript map has been improved at the suggestion of the Technical Services Division of the Geographical Branch in Ottawa by using solid and hollow dots and also "fractional" dots.

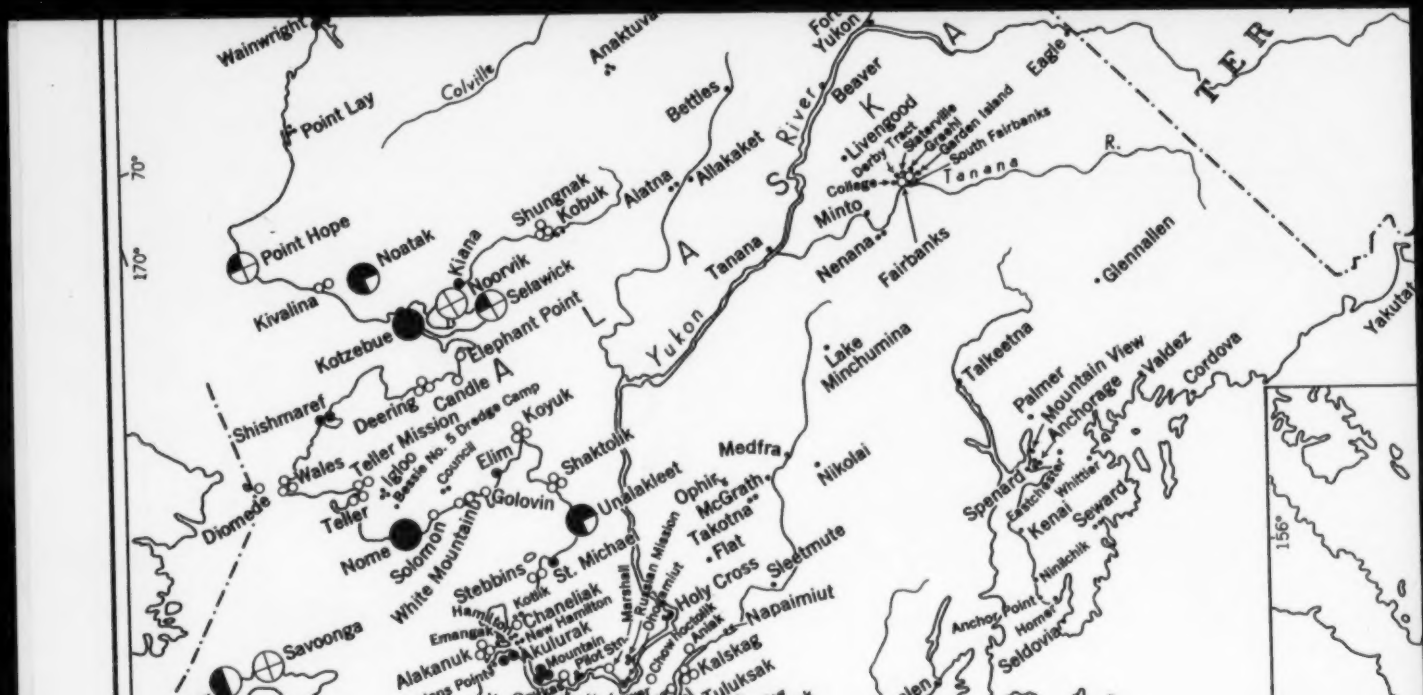
Unexpected difficulties arose in locating some settlements. This was due in part to errors in the original recording of the place-names by Census workers, to differences between local place-names usage and the names shown on published maps and to the absence of many place-names from the best available maps. Of the many collaborators who have, over the years, aided in tracing missing place-names, George Dalphin, Curator of the Map Collection at Dartmouth College, deserves special mention. Some confusion

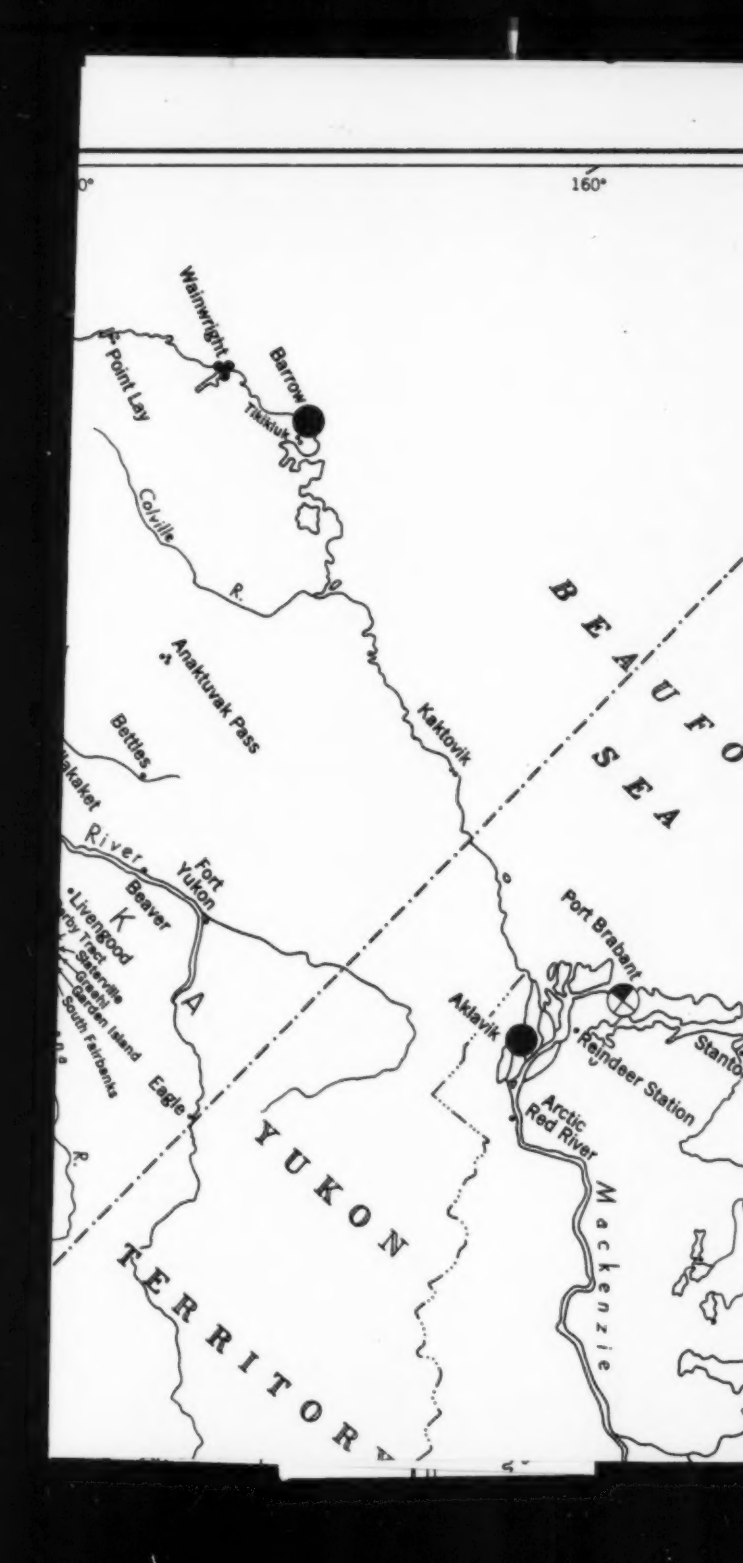
was added to the situation in the case of Greenland because of the tendency for very small, isolated settlements to be discontinued because of the change in the social and economic conditions taking place. When the map was first compiled, several place-names on the Greenland Census list could not be located; it was only in 1958 that the last of them was traced through the assistance of the Greenland Ministry.

The original drafting of the map was done by Joseph C. Smutnik. Some years later the whole of the material was rechecked by another student, Robert W. Dudley, and necessary additions and corrections were made. While minor errors of location or spelling may remain, the present map is believed to be as correct as available material makes possible.

It should be emphasized that the data shown on the map represent the period 1950-51, and were the most recent available when the work began. This period is of considerable interest because major changes in population distribution have since taken place, notably in Canada and in Greenland. In Canada the great increase in defence activity in the north, particularly that associated with the DEW Line, and the opening of a mine at Rankin Inlet, coupled with important reforms in Eskimo administration have led to considerable Eskimo migration even in the most isolated areas. The shifting of the large settlement of Aklavik (or rather its duplication on a new site) has also taken place. Construction of a new town has commenced at Frobisher. In the case of Greenland there has been an almost continuous decay of the very small settlements and a corresponding increase in size of the larger ones. The important settlement at Thule has been removed to make way for a very large airbase and the population now occupies several modern villages farther north. In the case of Greenland, the population distribution shown on the map has the additional interest in that it represents the situation before the large scale modernization of the country was started in 1951. The map, therefore, may be taken as representing the end of an era; it may be useful for a comparable map to be made some years hence so that the extent of the shift of native population can be judged.

Diomede
Teller
Nome
Solomon
White Mountain
Golovin
Unalakleet
St. Michael
Stebbins
Gambell
Savoonga
Kotlik
Chaneliak
New Hamilton
Emangak
Akulurak
Alakanuk
Sheldons Point
Mountain
Pilot Stn.
Marshall
Russian Mission
Ophir
McGrath
Takotna
Flat
Holy Cross
Sleetmute
Napaimiut
Aniak
Chow Hoctolik
Kalskag
Lower Kalskag
Tuluksak
Akiak
Tuntatuliag
Nanvarnaruk
Kwethluk
Napakiak
Napaskiak
Bethel
Akiachak
Kasigluk
Nunapitchuk
New Knock Hock
Pitkas Point
Chevak
Scammon Bay
Hooper Bay
Keyaluvik
Chukfaktoolik
Nilikluguk
Tanunak
Umkumute
Nash Harbour
Mekoryok
Chefornak
Cheeching
Kipnuk
Nunachuk
Eek
Kwinhagak
Kwigillingok
Platinum
Mumtrak
Togiak
Tuklung
Aleknagik
Manokotak
Dillingham
Kanakanak
Naknek
Pilot Point
Ugashik
Newhalen
Anchor Point
Homer
Seldovia
Ninilchik
Kenai
Seward
Kodiak
170°
160°
150°
156°


Wainwright
Point Lay
Colville
Anaktuvuk
Bettles
Allakaket
Alatna
Shungnak
Kobuk
Kiana
Noorvik
Selawick
Point Hope
Noatak
Kivalina
Kotzebue
Elephant Point
Shishmaref
Deering
Candle
Wales
Teller Mission
Igloo
Bessie No. 5 Dredge Camp
Council
Koyuk
Elim
Golovin
Teller
Nome
Solomon
White Mountain
Diomede
Shaktolik
Unalakleet
Stebbins
St. Michael
Hamilton
Kotlik
Emangak
Chaneliak
New Hamilton
Alakanuk
Akulurak
Mountain
Pilot Stn.
Marshall
Russian Mission
Ohogamiut
Crow Village
Holy Cross
Anvik
Napaimiut
Kalskag
Tuluksak
Savoonga
Yukon
Tanana
Fort Yukon
Beaver
Eagle
Liveingood
Dacoy Tract
Salcha
Graehl
Garden Island
South Fairbanks
College
Minto
Nenana
Fairbanks
Tanana R.
Lake Minchumina
Medfra
Ophir
McGrath
Takotna
Flat
Nikolai
Sleetmute
Glennallen
Talkeetna
Palmer
Mountain View
Anchorage
Valdez
Cordova
Yakutat
Spenard
Eastchester
Whittier
Seward
Kenai
Ninilchik
Anchor Point
Homer
Seldovia
70°
170°
156°
ALASKA
TER


160°
Wainwright
Barrow
Point Lay
Colville R.
Anaktuvak Pass
Kaktovik
Bettles
River
Fort Yukon
Beaver
Livengood
Eagle
Aklavik
Port Brabant
Reindeer Station
Arctic Red River
Mackenzie
YUKON
TERRITORY
BEAUFORT SEA


150°
80°
140°
ARCTIC
OCEAN
AUFORT
SEA
BANKS
ISLAND
rabant
Stanton
ndeer Station
Holman
Island
V I
Paulatuk
Read
Island
Coppermine
N O R T H
Tree River
Great Bear
Lake


160°
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ARCTIC
OCEAN
BEAUFORT
SEA
Barrow
Tikikluk
Kaktowik
Port Brabant
Aklavik
Reindeer Station
Stanton
Arctic
Red River
Mackenzie
BANKS
ISLAND
Holman
Island
Paulatuk
Read
Island
Coppermine
Tree River
Great Bear
Lake
YUKON
NORTH


140°
130°
120°
110°
100°
90°
80°
QUEEN ELIZABETH
ISLANDS
MELVILLE ISLAND
VISCOUNT MELVILLE SD.
PRINCE OF WALES ISLAND
SOMERSET ISLAND
Fort Ross
VICTORIA ISLAND
Read Island
Cambridge Bay
Spence Bay
Thom Bay
Lord Mayor Bay
King William I.
Old Post
Adelaide Peninsula
Gjoa Haven


80°
70°
60°
50°
40°
80°
ELLESMERE ISLAND
Etah
Siorapaluk
Oequertaq
Thule
Savigsivik
Kap York
Oequertat
Kuvdlorssuaq
Kraulshavn
DEVON ISLAND
Dundas Harbour
BAFFIN BAY
Arctic Bay
Pond Inlet
Clyde River
BAFFIN ISLAND
Thom Bay
Lord Mayor Bay
Igloolik
Noomata

60° 80°

30°

20°

GREENLAND

(DENMARK)

DAVIS STRAIT

Ilkermiog

Kraulshavn

Upernavik

Prøven

Sdr. Upernavik

Umának

Ritenbenk

Qutdligssat

Jakobshavn

Claushavn

Christianshåb

Godhavn

Egedesminde

Kangatsiaq

Igdlerfik

Agto

Holsteinsborg

Kangâmiut

Sukkertoppen

Gothåb

Broughton Island

Padloping Island

North Pangnirtung

Padlei Fjord

Kingnait Fjord

Pangnirtung

Noomata

Ooshooalook

Avataktook

Tessarallik

Bay

30°

20°

GREENLAND
(DENMARK)

Syd Kap

Kap Tobin

Kap Hoved

Proven

Umanak

Ritenbenk

Qutdligssat

Jakobshavn

Claushavn

Christianshåb

Godhavn

Egedesminde

Kangatsiaq

Igdlarfik

Agto

DAVIS STRAIT

Broughton Island

Padloping Island

Holsteinsborg

Kangamiut

Sukkertoppen

Padlei Fjord

Kingnait Fjord

Pangnirtung

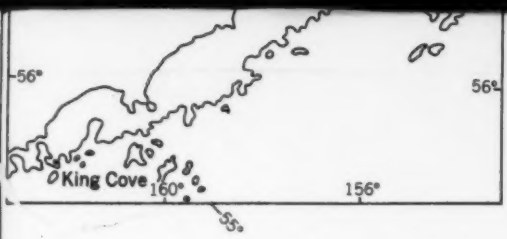
Bay

Oårnoq

Gothåb

Fiskenaesset

70°
Kap Tobin
Scoresbysund
Syd Kap
Kap Hope
Kap Brewster
20°
30°
65°
Ikateq (Sermilik)
Kap Dan
Angmagssalik
Tingmiarmiut
40°
Narssaq
Ivigtut
60°



50°

140°

THE DISTRIBUTION OF E
AND NATIVE GREENLA
1950-1951

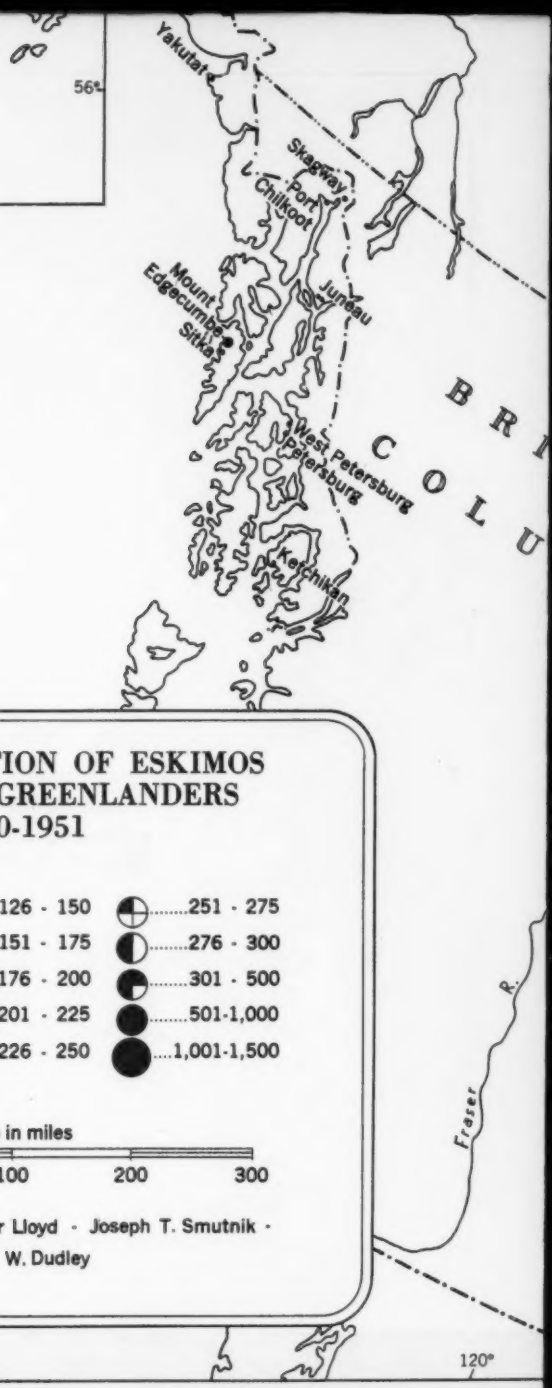
1 - 25		126 - 150	
26 - 50		151 - 175	
51 - 75		176 - 200	
76 - 100		201 - 225	
101 - 125		226 - 250	

Scale in miles

100 50 0 100 200

Compiled by: Prof. Trevor Lloyd · Joseph
Robert W. Dudley

130°



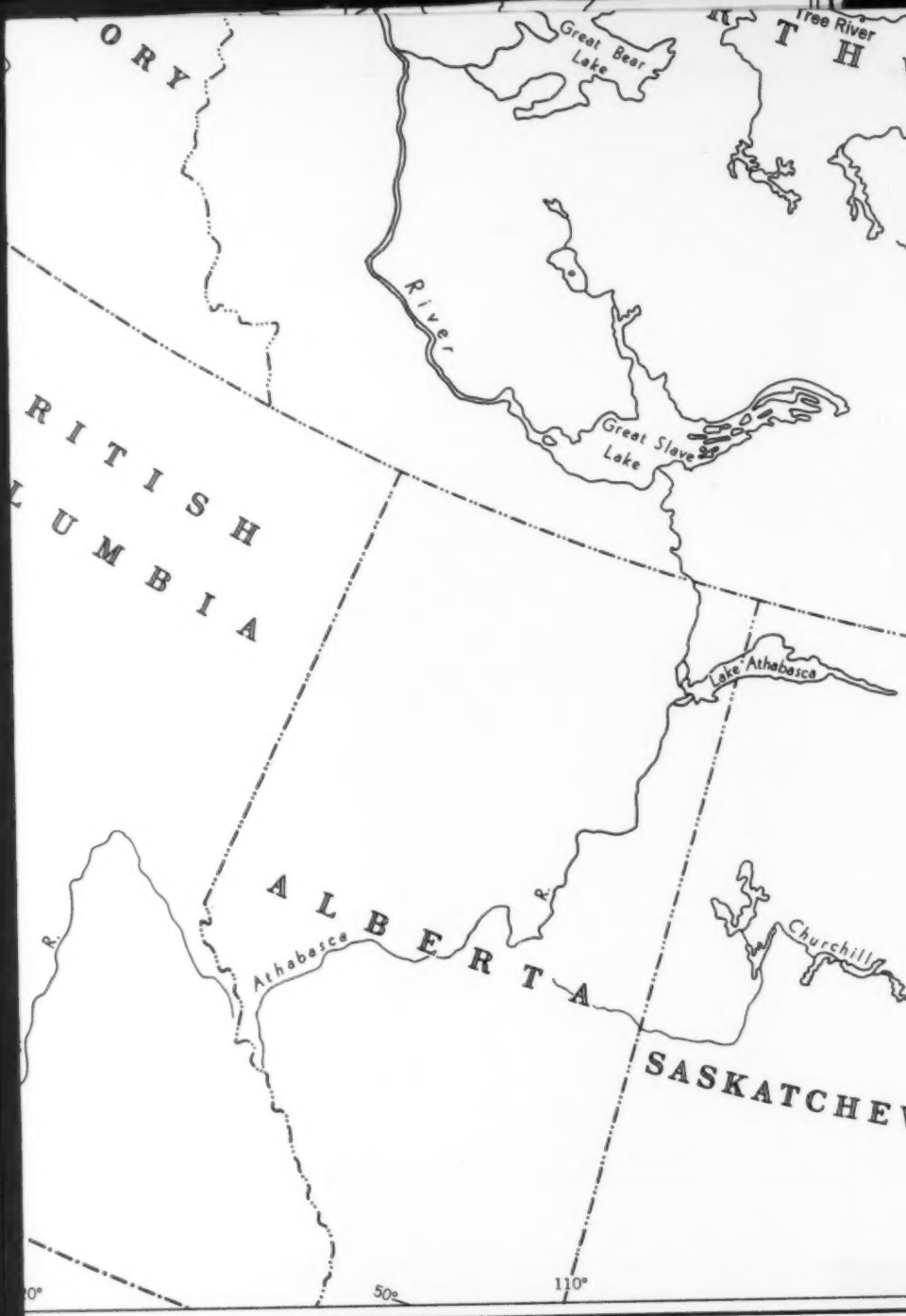
TION OF ESKIMOS GREENLANDERS 0-1951

126 - 150 ..... 251 - 275
151 - 175 ..... 276 - 300
176 - 200 ..... 301 - 500
201 - 225 501-1,000
226 - 250 1,001-1,500

in miles

100 200 300

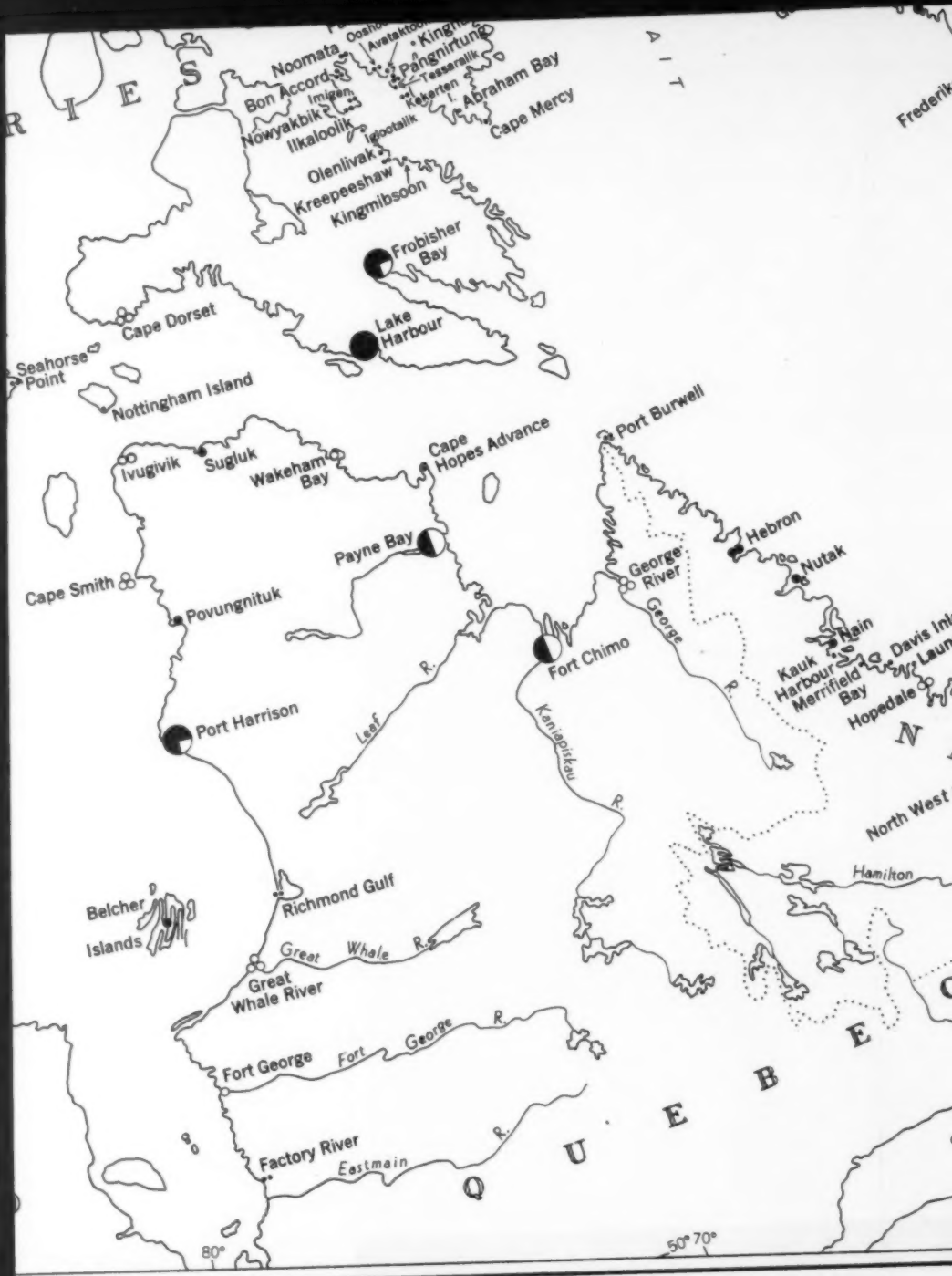
r Lloyd · Joseph T. Smutnik ·
W. Dudley


ORY
Great Bear Lake
Tree River
T H
River
Great Slave Lake
RITISH
LUMBIA
Lake Athabasca
ALBERTA
Athabasca
Churchill
SASKATCHE
110°
50°


Old Post
Adelaide Peninsula
Gjoa Haven
Perry River
Sherman Inlet
Bathurst Inlet
Backs River
Back R.
Thelon R.
Baker Lake
Padlei
Nueltin Lake
Churchill R.
Nelson R.
MANITOBA
100°


Old Post
Adelaide Peninsula
Gjoa Haven
Pelly Bay
Perry River
Sherman Inlet
Bathurst Inlet
Backs River
Back R.
Thelon R.
Baker Lake
Chesterfield Inlet
Padlei
Tavani
Eskimo Point
Nueltin Lake
R.
Nelson R.
MANITOBA
Severn
100°
90°


Pelly Bay
E R R I T O R I E
Repulse Bay
Duke of York Bay
Southampton I.
Post
Kirchoffer River
Munn Bay
Cape
Seahorse Point
Sixteen Mile Brook
Native Point
Notting
Manico Point
Ivugivi
Cape Smith
HUDSON
BAY
Belcher Islands
Severn R.
ONTARIO
90°


Noomata
Bon Accord
Imigen
Nowyakbik
Ilkaloolik
Igloolik
Oosho
Avataktoo
Kinghi
Pangnirtung
Tesserallik
Iketerten I.
Abraham Bay
Cape Mercy
Olenlivak
Kreepeeshaw
Kingmibsoon
Frobisher Bay
Cape Dorset
Lake Harbour
Seahorse Point
Nottingham Island
Ivugivik
Sugluk
Wakeham Bay
Cape Hopes Advance
Payne Bay
Cape Smith
Povungnituk
Port Harrison
Leaf R.
Fort Chimo
Kaniapiskau R.
Port Burwell
Hebron
George River
Nutak
George R.
Kauk
Harbour
Merrifield Bay
Nain
Davis Inl
Laun
Hopedale
North West
Hamilton
Belcher Islands
Richmond Gulf
Great Whale R.
Great Whale River
Fort George
Fort George R.
Factory River
Eastmain R.
Q U E B E
80°
50° 70°


Frederikshab
Arsuk
Ivigtut
Julianehaab
Narsarssuak
LABRADOR
SEA
55°
60°
Nain
Davis Inlet
Launce Ground
Aillik Point
Makkovik
Hopedale
Ticoralak
Rigolet
Cartwright
Battle Harbour
North West River
Mud Lake
Goose Bay
Hamilton
NEWFOUNDLAND

SHORTER COMMUNICATIONS — BRÈVES COMMUNICATIONS

CONSTITUTION OF THE CANADIAN ASSOCIATION OF GEOGRAPHERS

The following constitution was approved in November 1958. It supersedes all previous versions, the last of which appeared in *The Canadian Geographer*, No. 10, 1957.

Article I — Name

The name of the organization shall be "The Canadian Association of Geographers", and in French "L'Association Canadienne des Géographes".

Article II — Objectives

The objectives of this Association shall be to promote geographical study and research.

Article III — Membership

1) There shall be four kind of members:

a) Members

Full membership in the Association is open to all persons :

—with a graduate degree in geography

—with an undergraduate degree with honours in geography and who are now employed as full-time geographers

—who have made significant contributions in the field of geography.

b) Associate members

Persons who are actively interested in the aims of the Association but who do not have the qualifications for full membership may become Associate Members.

c) Student members

Full-time college or university students interested in the objectives of the Association may become Student Members.

d) Benefactors

Any person, institution or corporation wishing to demonstrate interest in the objectives of the Association by making a donation of $500.00 or more, shall upon application to the Secretary and approval of the Executive, be granted the title "Benefactor".

e) Association membership

Association Memberships are open to commercial, industrial or governmental organizations which wish to express their interest in and support of the Association. Such Memberships have no voting powers and receive all publications of the Association.

2) The dues for various classes of membership, life membership, and husband and wife membership shall be fixed by the Executive Committee.

3) Applications for Membership shall be scrutinized by a Membership Committee, which shall decide the type of membership to which an applicant is eligible.

STATUTS DE L'ASSOCIATION CANADIENNE DES GÉOGRAPHES

Les statuts suivants ont été approuvés en novembre 1958. Ils remplacent toutes les versions précédentes, dont la dernière est apparue dans *Le Géographe Canadien*, No 10, 1957.

Article 1er — Désignation

L'Association portera le nom de "Association canadienne des Géographes" et dans sa traduction anglaise "The Canadian Association of Geographers".

Article II — Buts

L'Association a pour but l'encouragement à l'étude et à la recherche géographique.

Article III — Membres

1) L'Association est composée de cinq catégories de Membres:

a) Membres actifs

Pour devenir membre actif, il suffit de remplir l'une des trois conditions suivantes :

—être titulaire d'un diplôme universitaire en Géographie

—être titulaire d'un baccalauréat spécialisé avec mention géographie et être employé à plein temps en qualité de géographe.

—s'être signalé par ses travaux en Géographie.

b) Membres associés

Peut devenir Membre associé toute personne qui s'intéresse activement aux buts de l'Association mais qui ne remplit pas les conditions pour devenir Membre actif.

c) Membres étudiants

Les étudiants qui poursuivent des études secondaires ou universitaires en Géographie et qui s'intéressent aux buts de l'Association peuvent devenir Membres étudiants.

d) Membres bienfaiteurs

Le titre de Membre bienfaiteur pourra être décerné à toute société, institution ou personne qui, désireuse de manifester son intérêt aux buts de l'Association, lui fera une donation d'au moins $500.00. La demande d'attribution de ce titre devra être déposée entre les mains du secrétaire de l'Association et être approuvée par le Conseil exécutif.

e) Accession des Personnes morales à la qualité de Membres de l'Association

Toute entreprise commerciale ou industrielle, tout organisme gouvernemental qui s'intéresse aux buts de l'Association et désire l'aider matériellement peut devenir membre de l'Association. Les membres de cette catégorie n'ont aucun droit de vote. Ils recoivent cependant toutes les publications de l'Association.

2) Le taux des cotisations pour les diverses catégories de Membres ci-dessus mentionnées, pour les Membres à vie et Membres conjoints (époux et épouse) seront établies par le Conseil exécutif.

3) Le comité de recrutement examinera attentivement les candidatures qui lui seront soumises et décidera de la catégorie de Membres à laquelle le demandeur peut accéder.

Article IV — Officers and Committees

1.—The elected officers of the Association shall be a President, a Vice-President, a Secretary, a Treasurer and an Assistant Secretary. At least one officer shall be English-speaking and another officer French-speaking.

2.—The business of the Association shall be transacted by an Executive Committee and committees appointed and sponsored by it. The Executive Committee shall be composed of the officers in article IV-1, the immediate past president and 6 elected councillors. To broaden representation on the Executive Committee, it may appoint two additional Councillors to serve for one year. Four shall be a quorum at Executive Committee meetings.

3.—The term of office for the officers shall be one year and for the elected councillors three years. Two councillors will retire each year. The President, Vice-President and Councillors will not be eligible for immediate re-election to the same office.

4.—The Editor of "The Canadian Geographer" shall be appointed by the Executive Committee.

5.—Two auditors shall be appointed annually at the Annual General Meeting to audit the accounts of the Association for the current financial year (January 1 — December 31).

6.—If any officer or councillor is unable to complete his term of office, the executive committee may fill his position by appointment for the remainder of his term. The appointee will be eligible for election to the same office.

Article V — Meetings

1.—A General Meeting shall be called during the Annual Meeting which shall be held if possible in the same period and at the same place as the other Learned Societies of Canada.

2.—All members shall be given two months notice of these meetings.

Article VI — Voting and Election

1) Constitutional changes.

a) Any proposed change in the Constitution may be submitted to the Secretary by a Full Member, if he has the support of five Full Members. The Secretary will circulate the proposed change to the membership.

b) Ratification of changes in the Constitution requires the approval of two-thirds of all Full Members in good standing replying to the ballot circulated by the Secretary.

2.—All business at the Annual General Meeting shall be settled by a simple majority of all members present and voting.

3.—A Nominating Committee composed of the three immediate Past-Presidents shall ask for nominations and with the Secretary shall conduct elections by mail three months before the Annual General Meeting.

Article IV — Bureau et comités

1.—Les Membres élus du bureau de l'Association comprendront un Président, un Vice-Président, un Secrétaire, un Trésorier et un Trésorier-adjoint. Parmi ces Membres élus, au moins un devra être de langue anglaise et un autre de langue française.

2.—Les affaires de l'Association seront traitées par un Conseil exécutif et des comités désignés par lui. Le Conseil exécutif sera composé des Membres élus du bureau de l'Association, tel que défini à l'article précédent, du Président sortant et de six conseillers élus. Afin d'élargir la représentation de l'Association au sein du Conseil exécutif, celui-ci peut nommer deux conseillers supplémentaires avec mandat d'un an. Le quorum des réunions du comité exécutif est fixé à quatre membres.

3.—La durée du mandat des membres du bureau sera d'une année et celui des conseillers élus de trois ans. Ces derniers sont renouvelables par tiers chaque année. Le Président, le vice-Président et les conseillers ne seront pas immédiatement rééligibles aux mêmes postes à l'expiration de leur mandat.

4.—Le conseil exécutif nommera le directeur de la revue "Le Géographe Canadien".

5.—Deux vérificateurs seront désignés chaque année au cours de l'Assemblée Générale annuelle aux fins de vérifier les comptes de l'Association pour l'année fiscale courante (1er Janvier au 31 Décembre).

6.—Si un membre du bureau de l'Association ou un conseiller est dans l'impossibilité d'occuper son poste jusqu'à l'expiration de son mandat, le conseil exécutif pourra nommer un remplaçant dont le mandat sera valable jusqu'à l'élection suivante. La personne ainsi nommée peut être réélue au même poste lors de cette élection.

Article V — Assemblées

1.—Une assemblée Générale sera convoquée lors de la réunion annuelle de l'Association qui sera tenue si possible à la même époque et au même lieu que celle des autres sociétés savantes du Canada.

2.—Les Membres de l'Association seront avisés deux mois à l'avance de la tenue de ces réunions.

Article VI — Vote et élections

1) Amendements aux statuts.

a) Toute proposition d'amendement aux présents statuts pourra être soumise au Secrétaire par un Membre actif de l'Association à condition qu'elle soit appuyée par cinq autres Membres actifs. Le Secrétaire fera connaître aux Membres de l'Association l'amendement proposé.

b) Pour être adopté un amendement aux statuts doit être approuvé par les deux tiers au moins des membres actifs en règle avec l'Association qui répondent au scrutin organisé par le Secrétaire.

2.—A l'Assemblée Générale annuelle le vote majoritaire des membres présents décidera des questions à l'étude.

3.—Un Comité de Présentation composé des trois Présidents immédiatement sortants établira la liste des candidats aux différents postes du Conseil exécutif et, avec la collaboration du

Article VII — Regional Committees

Any group of members in any region may set up a Regional Division of the C.A.G. upon ratification of the proposed Constitution of the Division by the Executive Committee.

Regional Divisions shall receive on request financial assistance from the Association up to a maximum of 10% of the total annual membership fees paid by members in that region.

secrétaire, fera procéder à des élections par correspondance trois mois avant l'Assemblée générale.

Article VII — Sections Régionales

Un groupe de membres (des différentes régions du Canada) peut constituer une section régionale de l'Association après ratification par le Conseil exécutif des statuts de ce nouveau groupement.

Les sections régionales recevront sur leur demande une aide financière de la part de l'association jusqu'à concurrence de 10% du total des cotisations annuelles payées par les membres résidant dans la région considérée.

GEOGRAPHY AT THE UNIVERSITY OF BRITISH COLUMBIA

On January 1, 1959, the largest Geography department in a Canadian university was established. The history of geography at the University of British Columbia is a long one compared with the recent development of this subject in Canada.* At the first session of the University in 1915-16, a course on Physical Geography was given by Dr. S. J. Schofield in the first term, preceding a second term course in General Geology. In the 1919-20 session Dr. Schofield introduced a new course, "Meteorology and Climatology" in the second term, required for students in the Faculty of Agriculture. It is probable that this was the first course on Climate given in a Canadian university, and it has been presented continuously since that time.

In the 1922-23 session the name of the department was changed from Geology and Mineralogy to Geology and Geography, to become the first department in a Canadian university to use the heading geography as descriptive of the departmental work. As part of the change a new course, Geography I, "Principles of Geography" was given for a full academic year, shared by Dean R. W. Brock and Dr. S. J. Schofield. Geography I was given for the first time for teachers in the Summer Session in 1924, and geography has been a significant part of Summer School offerings since that time. When the University of British Columbia moved to the Point Grey campus in 1925-26, the department was given ample space in the Applied Science building, and was one of the few university departments to have its own Reading Room. This fortunate physical placement as the result of a peculiar administrative arrangement, in which the department was in the Faculty of Arts and Science, but the Head of the department, Dr. R. W. Brock, formerly of the Canadian Geological Survey, was also Dean of the Applied Science (Engineering) Faculty.

In the following years the geography courses were given by different geologists on the staff, and it was possible for students to graduate with a geography major in the Arts and Science Faculty. In 1928 the first Visiting Professor, Dr. J. B. Appleton from the University of Illinois, was brought in to teach geography in the Summer Session. After 1935 the geography courses were consolidated when Dr. Gordon Davis was appointed, and he became responsible for the geography lecturing in the department. A further step in the development of geography (as distinct from geology) came during the Summer Session of 1937-40 when Visiting Professors from United States were invited to Vancouver to teach Upper Year geography courses. The first such geography-trained professor was Dr. Stephen S. Visher, from Indiana University, and in the succeeding two years, Dr. Eric Faigle, from Syracuse University.

By 1941 the geography offerings in the joint department had expanded to 5 full-year courses — Principles of Geography, Weather and Climate, World Regional, Physiography and Economic Geography. In 1943, however, the department lost its geography professor when Dr. Gordon Davis died of a heart attack while doing summer field work, and a few years of unsettled rearrangement followed. In 1945 Thomas R. Weir was added to the staff to teach some of the geography courses. Professor Weird had previously received his M.A. in geography from Syracuse University, and therefore was the first member of the department to have an advanced degree in geography.

In 1946 Dr. J. Lewis Robinson was invited by President Mackenzie to leave the federal government in Ottawa and come to U.B.C. to reorganize and expand the geography courses in preparation for the post-war increase in enrollment. When Professor Weir left in 1947 to continue his geography training, he was replaced by Professor John Chapman from Oxford University. In the succeeding years the department had a number of Visiting Professors and also gradually added permanent geography staff members, as geography enrollment expanded. Total geography undergraduate enrollments which were 200 in 1946 had risen to 800 in 1948! All of this was handled by a staff of 3 geography professors, who in addition had 7 or 8 graduate students for whom there were no specific graduate courses! The hectic days of the post-war crush, with offices and classrooms in converted Army huts, are part of the "growing-pain" memories of the recent history of geography at U.B.C.

* Information concerning the history of the department was obtained from a manuscript prepared by Professor Emeritus M. Y. Williams, Head of the Department of Geology and Geography from 1936 to 1950.

Total enrollments levelled off at about 650 to 750 in 14 undergraduate courses during the period 1952 to 1956. There were usually 5 or 6 graduate students each year, most of whom were departmental assistants in the large beginning course in Physical Geography. In 1953 the joint department was split into two Divisions with two Chairmen, respectively in charge of Geography and Geology. Enrollments increased again after 1956 when the College of Education and teacher-training courses were centralized on the campus and geography became a recommended subject for the prospective teachers. The undergraduate enrollment of 1250 in 12 full-year courses in 1958-59 made the U.B.C. Geography Department the largest in Canada. In like fashion the Summer Session enrollment, chiefly of teachers, also increased so that in 1958 there were 580 persons in geography summer courses and the department had 6 Visiting Geography professors from the U.K., the U.S.A. and Canada.

In the period after 1946, there were 54 students who registered for graduate training. The largest number of these, 12, had entered the secondary school teaching profession. In addition, each year more than half of the 50 or 60 undergraduate geography majors also go into the teaching field. Government service has been the next largest employer of graduate geographers, placing 11 geographers. Business and industry is taking an increasing number of geography graduate students in recent years; there are now 8 so employed. Five geographers have gone into the planning field, and in addition a number of undergraduate geography majors have taken their graduate training in the planning course at U.B.C. staff and a third at Victoria College.

Geography at U.B.C. has a strong physical base throught its years of association with geology, and it is not expected that this will change. The department feels, however, that there should be equal emphasis to each of the main systematic fields of geography. For this reason, regional geography is given less emphasis, except for Canada, and no attempt is made to give full courses on each of the continents. In all systematic courses, Canada and British Columbia are the focus of attention and are used as examples and illustrations.

J. Lewis Robinson.

VISIT OF SECRETARY — TREASURER OF I.G.U.

Dr. Hans Boesch, University of Zurich, visited Canada during September, 1958. He conferred with the Chairman and Secretary of the Canadian Committee and with Canadian members of I.G.U. Commissions. He also visited the Geographical Branch and officials of the Department of Mines and Technical Surveys, the Departments of Geography at the University of Ottawa, University of Montreal and McGill University and the McGill Sub-Arctic Research Laboratory.

B. Brouillette.

PRELIMINARY INVESTIGATION INTO THE MEASUREMENT OF SOIL HEAVE AT THE McGILL SUB-ARCTIC RESEARCH LABORATORY

The original intention of the writer was to carry out some scheme of measurement of frost heave throughout the year in different types of ground at Schefferville. Sites were chosen for their contrasting exposure of vegetation cover, but unfortunately the cold season was too far advanced before sufficient preparation could be made and a much attenuated programme was adopted. However, experience was gained and the following brief outline of the work completed also indicates possibilities for the future.

A site of 80 sq. ft. was selected adjacent to the area used for the National Research Council's snow survey of Canada as it was considered that some correlating evidence might be found common to the two areas. The site chosen had about 20% vegetation cover, consisting of the pioneer species dwarf birch (*Betula glandulosa*) and bilberry (*Vaccinium augustifolium*) with small stunted bushes of Labrador Tea (*Ledum groenlandicum*). The site appeared to be well drained; the surface was somewhat hummocky with a slight overall slope to the north.

The 80 sq. ft. was divided up accurately by theodolite and steel tape into a grid of 1 ft. squares and the sides marked by nails. The site was then levelled on 12th December 1957. On 11th March 1959, the site was carefully cleared of 25 inches of snow and relevelled. In each case, precise levelling was carried out with staff readings to .001 ft. and every precaution was taken in instrument adjustment and in ensuring that the staff was vertical and exactly at the required point. An accuracy of single readings to .005 ft. can be relied upon. The instrument used was a Kern DKM2 transtheodolite.

As absolute datum, five deep-seated boulders and pillars convenient to the site were levelled in. Their relative heights aggreed exactly in December and March and so it was assumed that their absolute heights had not changed. A more reliable datum post cemented to bedrock should be used wherever possible.

By mid-December, when the first levelling was carried out, the mean daily surface temperature had been below 32°F. continuously for over a month — most if not all the winter frost-heave would have already occured by this date. The ground was too deeply frozen to penetrate without the aid of a power drill. At Schefferville, therefore, preparations should be completed by the time the first frosts are expected at the end of September. After its initial preparation, the site should not be approached again for fear of disturbing the surface; this is obviously more important when the temperature is fluctuating across the freeze-thaw line and the ground is soft than when the ground is frozen hard; in this particular case, with the soil frozen to several feet depth by March, it is not thought likely that any deformation would have occured during the clearing of the snow of the second levelling.

	H	G	F	E	D	C	B	A
10	6.297	6.260	6.240	6.215	6.285	6.790	6.063	6.300
			+.018	*+.029*	*0.0*			*+.063*
9	6.368	6.335	6.280	6.277	6.215	6.190	6.120	6.252
			+.005					
8	6.253	6.270	6.284	6.292	6.210	6.790	6.173	6.180
			—.014			*—.003*		*+.040*
7	6.033	6.106	6.118	6.100	6.100	6.110	6.230	6.335
								+.025
6	M	5.978	5.900	6.112	6.193	6.175	6.213	6.535
								+.011
5	5.740	6.022	6.180	6.175	6.230	6.213	6.205	6.320
			+.016			*+.010*		*+.038*
4	5.694	6.020	6.130	6.210	6.250	6.222	6.185	6.193
			—.007			*—.006*		*+.005*
3	5.724	5.965	6.020	6.050	6.125	6.153	6.080	6.140
						+.009		*—.026*
2	5.790	5.398	5.800	5.750	6.575	5.345	5.650	6.025
1	5.844	6.010	5.720	5.700	6.65$	5.740	6.010	6.160
								—.025
0	5.898	6.058	6.053	6.040	6.038	6.097	6.079	6.210
		+.015	*+.010*	*—.014*	*+.012*	*—.010*	*—.007*	*+.014*

FIGURE 1.— Measurement of Soil Heave.

A comparison of the December and March sets of readings is made from Figure 1. By March frozen run-off water covered a considerable proportion of the site, limiting the area of comparison mainly to the edges. The full set of figures represent the heights (in feet) of the grided points above local datum as measured in December; the discontinuous set of figures in italics below these indicates the absolute movement of each point, either upwards as a heave (positive) or downwards as a contraction (negative). The figures indicate that both heave and contraction have taken place. The maximum heave is .063 ft. (1.84 cm.) an exceptional amount occuring at a point on top of a slight hummock. The other difference range between plus .040 ft. (1.22 cm.) and minus .026 ft. (0.79 cm.). In spite of the limited points for comparison, it seems significant that the consistently highest individual values for heave are at points initially above the mean ground level, and the greatest contractions are at points initially below the mean ground level. The magnitude of the height difference is however so close to the adopted instrumental working error that the actual quantitative values cannot be regarded as reliable, nor are they sufficiently numerous for statistical analysis.

A complete site analysis for evidence of seasonal soil movement should certainly include, besides the physical measurement of heave, supplementary work aimed at identifying and measuring the processes involved. Instruments for climatological data should include max. and min. thermometers, a grass min. thermometer, a thermograph and rain and/or snow gauge. For observations beneath the surface, thermistors are essential. The Stantel, M5250300 type was found to be very convenient because of its small size. (Several of these were fully calibrated with a Wheatstone Bridge and set out in the field of varying depths; they gave readings accurately to .02°C. The actual soil-heave site had become deeply frozen before they could be used constructively). Thermistors should be inserted in a regular pattern plan and preferably in vertical groups of three, perhaps at 5, 15 and 30 cm. depth. Thermistors should be calibrated both before and after any extended field use. Piezometric tubes give values for pore-water pressures. Also suggested as an additional or alternative item is the Bouyoucos soil moisture indicator, useful before the ground freezes in showing soil moisture indicator, useful before the ground freezes in showing soil moisture content.

Surface ice could be prevented or at least decreased by forming either a trench or a raised guard around the site at sufficient distance not to interfere with the physical conditions on and under the site.

The thermistors and moisture indicators should be provided with long leads running off the site to a switching terminal box to prevent trespassing after the experiment is under way. Removing the snow cover to re-level will disturb the established thermal balance; a possible solution is a series of floating markers resting on the top of the ground and projecting above the snow. These could be intersected by theodolite from known positions and their heights accurately calculated.

At the end of the experiment, the soil may be carefully dug up for an examination of its physical constituency and chemical properties.

The lack of results on this piece of work was due to the use of techniques too crude and a start much too late in the season. But it is felt that the method proposed is practical and that if it were developed, it could give valuable results. Note however, that the observations for this type of experiment should ideally be of time units of one year — hence, by trials and subsequent modifications, it might be several seasons before a completely satisfactory method were worked out.

R. P. KIRBY.

A CANADIAN COLONY IN NINETEENTH CENTURY CALIFORNIA*

In the latter part of the nineteenth century, a series of developments, fostered by railway building and promoted by extensive propaganda, jarred the land of southern California with an agricultural boom. Because of the need to secure water rights and lay out irrigation facilities, settlement was a complex procedure necessitating some kind or organization. This was provided by the colonizing company whose fudamental concern was making water available and the way in which this was done usually determined the success of failure of the company. One of the most successful operations was that of the Ontario colony, established by the Chaffey brothers from Kingston, Ontario and named after their home province. It summarizes conditions and developments of colony formation and was a pioneer and model for many ventures that followed.

Ontario was located in the foothill belt below the San Gabriel and San Bernardino Mountains adjacent to Los Angeles. Here a series of alluvial fans provide a combination of physical advantages for citrus culture — sites that are practically frost-free, fine soils on the lower parts of the fans, surface and sub-surface water for irrigation and proper slopes for drainage. It was here too that railroads were built along level land to and from Los Angeles. The colony was publicized in typical boom period fashion with pamphlets, newspaper accounts, supervised sales and special excursions. The first appeal went to the province of Ontario and in the early years of the colony it provided the largest single group of settlers. By 1888 the total area irirgated was 1,750 acres, of which 886 were in citrus orchards. The former desert tract was no more. In its place were orange groves, fruit orchards and vineyards, gardens, houses of stucco, streets and railway lines. And although the colony continued to grow, it retained its rural features until the upheavals brought about by World War II and the postwar period.

R. L. GENTILCORE.

* Abstract of a paper presented at the Ninth Annual Meeting of the Canadian Association of Geographers, Saskatoon, Saskatchewan, 1959.

NEW PUBLICATIONS — NOUVELLES PUBLICATIONS

THREE CENTURIES AND THE ISLAND. By ANDREW H. CLARK. 287 pp.; maps, tbls. The University of Toronto Press, Toronto, 1959. $10.00.

The historical geography of Prince Edward Island was largely ignored until Andrew Clark applied his meticulous scholarship to the task of unravelling the past. He portrays the image of the island at successive dates in its history by showing the areal relationships of such factors as topography, natural vegetation, land grants, population, agricultural crops and livestock. The frequent use of maps to illustrate the factors discussed is one of the most outstanding features of the book. Exhaustive as this investigation is, the author considers it merely a pilot study for his similar investigation of Nova Scotia. Both studies of Maritime Canada are part of a series planned by the author to illustrate the manner in which emigrants from northwestern Europe reacted to new environments in overseas lands. His earlier work, *The Invasion of New Zealand by People, Plants and Animals: The South Island*, published in 1949, represents the first regional study of the series.

The book begins with a concise introduction in which the areal differentiation of agricultural land use and land value in 1951 is discussed. It is made clear that agriculture is the main industry and that the book will emphasize the changing patterns of population and farming throughout the island's history since Europeans first became aware of its existence. An attempt is made in the second chapter to describe the island as it appeared to the early explorers, Jacques Cartier and Nicolas Denys, and to envision its character as Abegweit, under the occupation of the Micmac Indians. The very brief but comprehensive description of the physical geography establishes the background for the entrance of European settlement.

The arrival of the first settlers in 1719 marked the beginning of permanent occupation of Ile St. Jean by the French. In spite of the limited information available, one gains an appreciation of the difficulties the settlers experienced in wresting a living from the primeval environment. The uprooting and expulsion of the Acadian French by the British in 1756 ended the French period and cleared the island for the ambitious plans of British settlement.

During the second half of the eighteenth century the Island of St. John was surveyed by Captain Holland and a few meagre settlements were established. The survey divided the island into 67 lots which were granted to proprietors with the stipulation that a certain number of settlers be established within ten years. In later years the lots became the townships and all census data was collected according to these divisions. A small map showing the lots is reproduced on page 44, so placed that the book must be turned sideways to read it. Yet, throughout the book one must refer constantly to this map in order to locate the townships mentioned in the text. The ideal arrangement would have been a fold-out map placed at the back which could be referred to without turning a page. A larger map broken in the centre to occupy two pages would have been a satisfactory alternative. The location maps at the beginning, Figures 1 and 2, are of this type.

A brief section on the early nineteenth century, when the name was changed to Prince Edward Island, describes the rapid immigration and the establishment of basic patterns of population and land use. Until the eighteen-forties the statistical data was insufficient to permit a relatively complete reconstruction of the island's geography, but the portrayal of the island at the turn of the century is comprehensive. Numerous dot and density maps are used to illustrate distributions and significant ratios, such as the cattle-horse ratio and the sheep-swine ratio. Attention is directed particularly to the distribution of settlers by origin, mainly Scottish, English, Acadian and Irish, and the characteristic agricultural practices attributable to each group.

The latter part of the book is devoted to a detailed consideration of changing patterns of land use and population since Confederation. In this period the flow of immigration virtually ceased and the pattern of emigration which has continued to the present day became established. The numerous changes in agriculture, including the introduction of fur farming, are liberally illustrated by maps. Increases and decreases of various crops are shown commonly by solid and open circles, respectively, and ratios are used quite effectively. The sheep-swine ratio is one of the most interesting, as a complete reversal occured in the dominance of sheep versus swine on the better farms during the past century.

The final chapter summarizes the book and draws valuable conclusions concerning agricultural trends and the influence of distinct culture groups on patterns of land use and farming practices. However, neither a critical appraisal of the present agricultural economy nor a recommendation for improvement of present conditions is attempted. The author's concept of historical geography is clarified and the book is offered as a contribution to this field.

It is an outstanding contribution to the historical geography of Canada and sets an example for others who would pursue similar studies. Broadly conceived and scholarly executed, the work is impeccably honest in its presentation of facts and well documented with notes following the text. In striving for brevity the author occasionally sacrifices the readability of the text. This occurs when frequent subordinate clauses or bracketed phrases are used to present extra information within a sentence. However, this minor shortcoming detracts little from the great stature of the work.

CHARLES FORWARD

ATLAS OF AUSTRALIAN RESOURCES — Five New Sheets. By the Department of National Development, Canberra, Australia. Available from Angus and Robertson Ltd., London, Sydney and Melbourne. 10s.6d. each. 29¼ x 28¼ inches.

To date the Department of National Resources, Canberra, has issued 25 sheets of which those reviewed below are the most recent received. A preliminary index lists a total of 42. If the whole may be judged by the parts, it will indeed be an excellent national atlas.

Each sheet is accompanied by a commentary in the form of a pamphlet of 20 or so pages which, while primarily intended to elucidate the map, is in style and content similar to a well-written and comprehensive encyclopedia article. Among other features to be commended are the extensive acknowledgements and references for each plate. The cartography and printing are of top standard and suggest a high level of initiative, originality and imagination on the part of the compilers. The plates so far produced are not only a very good advertisement for Australia but also for geography.

For most plates, the base is on a polyconic projection, scale 1:6,000,000. It is printed in faded buff and shows hydrography, state boundaries, railroads, names of major orographic features and coastal landforms, place names and geodetic graticule with 6 and 9 degrees intervals for parallels and meridians respectively. The surrounding seas are printed in light blue. The maps are photolithographed and printed by several commercial establishments in Australia.

Educational Facilities (Ref. No. A 102/20.22 March 1956) Using three geometric symbols in two sizes and six colours, educational institutions above primary level are classified by attendance (above 100 and below 100), by level of education (3 levels) and by nature of instruction (7 types). A seventh colour indicates non-government schools. All educational institutions in the Commonwealth fitting the classifications are plotted and their locations named. In the case of the larger centres the symbols are boxed and offset, with figures adjoining each symbol to indicate the number of each classification within the city area. There are also several large scale insets for areas which would otherwise be heavily congested with symbols. The commentary which accompanies this plate has large-scale maps of the larger cities showing the distribution of the institutions represented in the boxed offsets. The use of large-scale insets is a recognition of the congestion that results from a finely divided classification. There is in fact a fairly serious congestion in all the more densely populated areas and this might have been an argument for presenting the subject on a series of maps of the different parts of the country at better scales than is possible with the standard base map.

Three levels of population density printed in unobtrusive shades of the base map colour indicate in particular the less densely populated areas.

Health Services (Ref. No. A 102/20.23 Jan. 1957.) In its cartographic method this plate is similar to the Educational Facilities plate. The data are shown by coloured geometric figures and the information on population density given on Educational Facilities is repeated. Public and private hospitals are indicated by red crosses, solid and hollow respectively, and Bush Hospitals by a green cross. The symbols are in five sizes by number of beds. Five types of specialized treatment are indicated by alphabetical code adjoining symbols. Bush Nursing Centres, Flying Doctor Bases, Leprosaria, and Ambulance Service are indicated by separate symbols. Congestion of symbols in large city areas is avoided by offsetting one each of the involved symbols and indicating the number of hospitals and total number of beds by adjoining numbers.

Dominant Land Use (Ref. No. A 102/20.24 Jan. 1957). The land use classifications are as follows: Under the heading Beef Cattle the following are separately classified: breeding, breeding and fattening, intensive breeding and fattening, fattening; Under the heading Sheep and Cereals: wool, wheat and other cereals with wool and fat lambs, wool and fat lambs; Under the heading Other Uses: dairy cattle, sugar cane, timber with occasional grazing, and grouped under one classification, fruit, vines, flax, tobacco, cotton, rice or peanuts. Built-up areas and areas of no significant land use are treated as land use classifications. Isohyets of average annual rainfall are given.

Including the base colour, water blue and black, the map employs 10 colours of which six are used to show land use, a seventh is used for the isohyets, while inland water bodies are white with a black binding line. The 13 land use classifications are derived from six colours by the use of screens, rulings, overprinted geometric patterns, as well as solid colours. The solid colours are reserved for the classifications of least area and by this means, with the given distribution, a good colour balance is obtained. The smallest pattern is about 1/32" in diameter, representing about 9 square miles.

In addition to the place and feature names given on the base map the names of certain municipalities both large and small are printed in black, as well as certain non-delineated areas, presumably economic regions. The significance of the selection of these names is not explained.

As with most land use maps this one is not self-explanatory but needs to be complemented by additional information. In this respect the accompanying commentary and the plates on hydrology and climate (published earlier) are most useful.

Population Increase and Decrease 1947-54. (Ref. No. A 102/20.25, 1957). This sheet, which covers the period 1947-54, is similar to one on the same subject published in 1954 which covered the period 1933-1947. The cartograyhic methods used are the same in each

case. The changes in population trends and the magnitude of change are such as to amply justify the production of the two maps in such rapid succession, and this is in fact a tribute to the alertness of the producers of the Atlas.

Urban and rural population are treated separately, the former in terms of change in absolute numbers per urban municipality, the latter in terms of changes in absolute density according to local government area statistics. The discrimination between urban and rural has the advantage of suggesting direction of population migration. Changes are given in absolute numbers, or more correctly ranges of absolute numbers, rather than in percentages. This has the advantage of very clearly showing where changes have taken place and avoids the disadvanage of large changes in absolute numbers being disguised by small percentage figures. At first glance, however, there is an element of ambiguity, in that the range figures are apt to be taken as terminal numbers for past and present population. For example the range of change 237,000 — 375,000 is apt to be taken as meaning that the population at the beginning of the period was 237,000 and 375,000 at the end of the period, whereas the correct meaning is that the change within the period has been not less than 237,000 and not more than 375,000. The fault is not really in the map, but the legend could be more explicit. The map of Population Density and Distribution is available to correct any misinterpretation.

The cartographic method is simple and effective. The ranges of change for urban population are keyed to proportional spheres, red for increase and blue for decrease. There are eighteen ranges covering all urban centres above 500 persons. The population of centres below this size is considered as rural. There are ten ranges of rural density change shown by graded colours with a readily visible colour difference between increase and decrease.

Ports and Shipping (Ref. No. A 102/20.26 July 1957). Using eleven colours including base colour, black and water blue, this map by the use of solid colours, ruling, screens, symbols and numbers gives data on the following: number of berths and deepest berth per port; volume and type of cargo with 16 cargo classifications; origins and destinations of cargo with a fourfold differentiation of overseas and home exports and imports; volume of passenger arrivals and departures (for ports with volume above 1000 in 1954-55) with a four-fold differentiation of Australian and overseas origins and destinations; hinterlands of ports; shipyards.

Information on 84 ports whose classification as Major, Secondary, or Other are indicated by size of symbol, is given. Full data, as outlined above, are for major and secondary ports only, 36 in all. Data for 'Other' ports are for number of berths, depth of deepest berth and hinterland. Full data for any one port are given by at most four symbols grouped near the location. Information on berths and depth is given by numbers entered within and adjoining the port symbol. Cargo characteristics are indicated by groups of four bars with colour, segments identifying cargo-type and volume, with pointers distinguishing in-going from out-going and colour of binding line differentiating overseas from domestic. Passenger traffic is given by proportional circles with four segments showing proportions of overseas and domestic landings and departures. Two classifications of shipyards are shown by pictorial ship symbols. Hinterlands are keyed to their ports by colour. Overlapping hinterlands are indicated by a banded pattern in the colours assigned to the ports involved. Since there are more ports and hinterlands than there are colours, the same colours are used repeatedly but are adequately separated by other colours so that confusion of hinterlands is avoided.

The rather simple configuration of the Australian coastline has obviously facilitated the plotting of the voluminous data and the method would probably be less successful for a country with larger ports closer together on a more irregular coast. This does not detract from the fact that the subject of this map is treated comprehensively and with admirable cartographic economy, with results both informative and pleasing to the eye.

G. FREMLIN.

SENIOR GEOGRAPHY FOR SECONDARY SCHOOLS by D. Wadell. 530 pp.; maps, photos. The Copp Clark Publishing Co. Ltd., Toronto, 1956. $3.75, 8 x 5½ inches.

This new textbook for Canadian secondary schools was prepared by arrangement with University Tutorial Press Limited of London and Cambridge, England. It is based on their copyright volumes on Europe, North America and Asia and is thus essentially a compilation of material already published. This is evident in the book itself especially as there are signs that the compilation was done hastily and somewhat carelessly. The first and second sections, for instance, begin with the bold headings "Europe" and "Asia" but the North American section is not so headed. Thus Chapter XXXIII, entitled "Siam and Indo-China", is followed immediately by a chapter headed "Structure and Physical Features". Only the material in the chapter itself indicates that it is of North America! However, the publishers may have considered that a section title would have been misleading for certainly Canada, Alaska and Greenland are almost completely neglected. Not even one section of one chapter is devoted to the northern half of the continent whereas eight are given over to the United States of America (excluding Alaska). Thus the student is told only that "one of the largest and richest iron ore deposits is mined round the western end of Lake Superior... and... iron is also mined on the Alabama coalfield." No mention of Steep Rock or Labrador-Ungava!

Many of the chapters lack coherent organization (a good example being those concerned with the U.S.S.R.). Also the book is written

in semi-note form which has its advantages from a school teaching (or learning) point-of-view but which detracts from the stature of the work as a book. As, indeed, does the title of the volume, which conveys little to those who are not concerned with high school teaching in Canada. Even to those it may be confusing for the title on the cover is "Senior Geography" while on the inside page it is "Senior Geography for Secondary Schools" (a term not universally used in Canada).

Yet the book is not without its merits. Its photographs are good, but not overdone and the sketch maps and diagrams are abundant, clear, concise and to-the-point. Not the least of its virtues, at least to this reviewer, is the fact that it was written (or compiled) by a Canadian teacher in a Canadian high school. This makes it a milestone and a real achievement. With all its faults, Mr. Waddell has done what many of our university professors have been talking of doing for more than a decade.

N. L. NICHOLSON.

STATISTICAL ABSTRACT OF LATIN AMERICA FOR 1957. Committee on Latin American Studies, University of California, Los Angeles, 1959. $2.00. 8½ x 11 inches.

The Committee on Latin American Studies should once again be commended for their continuing contribution toward a more comprehensive Statistical Abstract. The title may be somewhat misleading, however, since both Canada and the United States are represented on each of the 16 separate tables (called plates in this publication) as well as on the fold-in resume of Foreign Trade just inside the back cover. Among several innovations incorporated within the new edition, the adoption of a common fiscal denominator for the Public Finance data is most welcome. Arrangement of the independent states of Latin America into three regional groupings — Central American, Antillean and South American, should also facilitate work with the tables. Mexico is not included in these regional groupings, but like Canada and the United States, is shown separately. Everything considered the Abstract appears to be in better form generally than previous versions.

In using Canada for illustrative purposes, we find Plate 1 gives the total area as 9,974,376 square kilometers; 3,850,109 square miles, and 2,464.070,000 acres. Under "Land Use" it lists the number of acres of arable land and land under tree crops (100,282,000 acres) and percentage of total acreage (4%); number of acres in permanent meadows and pastures and percentage of total; number of acres of forested land and percentage of total; unused but potentially productive acreage and percentage of total, and in the final column, lists other land not accounted for and percentage of total.

Plate 2, Population, lists the latest official census figures; ration of male to female, percentage of females; gives latest population estimate with date, name of the capital and its population, population density per total and per arable land, rural density in percent, percentage of males and females, and ethnic distribution according to Indian, Negro, White, Mixed and Asian.

Plate 3 covers Social Statistics which is subdivided into religious composition, linguistic composition (Spanish, Native, English, others), literary, school attendance, newspapers, newsprint consumption and cinema attendance. Plate 4, Education, lists number of schools, teachers training. Plate 5 covers Vital Statistics and Housing. Plate 6, Health and Social Security. Plate 7, Labour Statistics. Plate 8, Gross Domestic Product, Forestry, Fishing and Agriculture. Plate 9 lists Agricultural Production for 1956 under wheat, maize, rice, all grains, root crops, pulses, oilseed, raw sugar, coffe, cacao, banana, tobacco and cotton; on the same plate Livestock is listed under headings of horses, mules, asses, goats, cattle, hogs and sheep with date of census.

Plate 10 lists Mineral Production for 1956 ranging from fuels, through precious metals to iron, lead and zinc; on the same plate is Electrical Energy. Plate 11 lists Industrial Production for 1956 and runs the gamut of basic commodities from sulphuric acid through pulpwood and textiles. Plate 12 continues with Industrial Consumption, Communications and Transportation. Plate 13 is a further elaboration of Transportation into sub-divisions of civil aviation, merchant fleets, sea-borne shipping and railways. Plate 14 covers a diversity of Foreign Aid Programs, Investments, Elections and Armed Forces. Plate 15 covers Public Finance under categories of Budget Expenditures, Budget Receipts, Budget Balance and Public Debt. Plate 16 is a terse but easily understood Financial Statistics table showing par values, money supply, exchange rates, currency in circulation, national income, gross national product, price index and foreign trade (imports and exports).

Statistics remain prone to variations, however, as we note that the 424,060 square miles accorded Bolivia in the old tables (1956) are now registered as 424,052. But this Statistical Abstract is still the best source of information obtainable for Latin America — at least in the form of a general resumé. The great shortcoming of the data it contains is the fact that such information originated some time in the past. The period from the date of original compilation and the time it actually appears in the abstract may vary from a few months to several years. Thus, for instance, much of the data for Bolivia dates back to 1950-51. Moreover, this current abstract appears in the year 1959 but is entitled Statistical Abstract for 1957. Would it be possible to devise a series of constants to bridge the gap between the original date of compilation and the time the abstract actually finds its way to our work bench? If something could be done along these lines, the abstract might become even more meaningful.

SELVA C. WILEY.

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